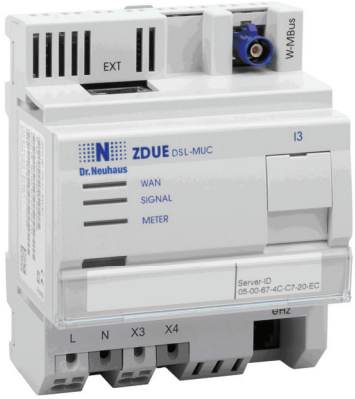
User Manual

ZDUE-GPRS-MUC

ZDUE-PLC-MUC

ZDUE-DSL-MUC



ZDUE-DC-MUC

Dr. Neuhaus

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Firmware; from Version 1.2x

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Classification of the Safety Precautions

This manual contains safety precautions that must be observed to protect your own personal safety and to prevent any damage to this or other equipment. The notes on your personal safety are marked with a warning triangle; notes referring to equipment or property damage only are not marked with a warning triangle. Depending on the seriousness of the hazard, the precautions are illustrated in the following order.

Danger

means that death or serious injury **will** result if the corresponding precautions are not taken.

Warning

means that death or serious bodily injury **could** result if the corresponding precautions are not taken.

Be Careful

with a warning triangle means that minor bodily injury could result if the corresponding precautions are not taken.

Be Careful

without a warning triangle means that equipment damage could result if the corresponding precautions are not taken.

Attention

means that an undesired result or situation could result if the information in the note is not observed.

If more than one safety hazard is involved, the warning note with the highest hazard level will be indicated. If a warning referring to personal safety is indicated with the warning triangle, the same warning could also contain additional information on equipment damage.

General Information

The ZDUE-GPRS-MUCs are compliant with the European EN60950:2006 standard, Information Technology Equipment - Safety Standards.

The ZDUE-GPRS-MUC is not designed to be connected to IT systems for the electrical power supply.

Please read through these installation instructions carefully before using the device.

Qualified Personnel

The respective device/system is only to be set up and operated in combination with this documentation. A device/system is only to be put into operation and operated by **qualified personnel**. Qualified personnel in the sense of the safety precautions in this documentation are persons who are authorized to put into operation, ground and mark devices, systems and electric circuits and systems according to the standards of safety engineering.

Intended Use

Please note the following:

Warning

The device is to be used only for the intended uses indicated in the spec sheets and in this document. The correct, safe operation of the product assumes proper transport, proper storage, set-up and assembly as well as careful operation and servicing.

Protection Against Contact

Warning

While in operation, the ZDUE-MUCs must be covered by a panel or an enclosure that offers sufficient protection against contact with dangerous voltages. Only the raised front area with the operating displays, customer interfaces and keypad may be touched directly.

Disconnection from the Power Supply Circuit

Warning

An easily accessible, all-pole circuit breaker in the power supply circuit is required for the house installation. Alternatively, a single-pole circuit breaker can be used in the outer conductor as long as a distinct neutral conductor has been integrated into the supply line. In Germany, the circuit breaker must at least meet the requirements of the DIN VDE series 0100 standard.

Installation Fuse

Warning

The house installation requires an installation fuse that complies with the DIN VDE series 0100 standard and is properly adapted to the cable cross-section of the power supply line. The additional short-circuit protection must have a selectivity of I > 1500A.

Transient Overvoltages

Warning

The ZDUE-MUCs are devices in Overvoltage Category II. If the ZDUE-MUCs are likely to be exposed to higher transient overvoltages than those in Overvoltage Category II when connected, it will be necessary to take further safety precautions for the installation.

Cable Routing

Warning

The space between antenna/data lines and lines carrying dangerous voltages must be at least 10 mm.

Wireless Equipment (ZDUE-GPRS-MUC and ZDUE-DC-MUC only)

Warning

Never use the device in areas in which the use of wireless equipment is prohibited. The device contains a radio transmitter, which could interfere with the operation of such medical electronic equipment as hearing aids or pacemakers. A doctor or the manufacturer of such devices can provide more detailed information.

To avoid demagnetizing data media, do not store any diskettes, credit cards or other magnetic data media close to the device.

Antenna Installation

Warning

The recommended radiation limits of the German Commission on Radiological Protection (www.ssk.de) from 13/14 September 2001 must be observed.

Attention

When laying the antenna cable, be sure to adhere to the bend radiuses. If you do not adhere to the bend radiuses of the antenna cable, this will result in a deterioration in the quality of the transmission and reception attributes of the device. The minimum bend radius must not be less than 5 times the cable diameter statically and 15 times the cable diameter dynamically.

Installation of an Outside Antenna

Be Careful

When installing an antenna outdoors, it is absolutely necessary that the antenna is installed properly by qualified technicians.

The outdoor antenna must be grounded to protect it against lightning strikes. The outdoor antenna shield must be reliably connected with the protective ground.

The corresponding national installation guidelines must be followed for the installation process.

In Germany, this is the VDE 0185 (DIN EN 62305) Parts 1 to 4 series of standards for buildings equipped with lightning protection systems and the VDE 0855 (DIN EN 60728-11) series of standards if there is no lightning protection system installed.

Connection Costs for GPRS

Be Careful

Please note that when a connection is only being (re-)set up, data packets incurring costs are exchanged during connection attempts to the other party (e.g. server switched off, wrong destination address, etc.) as well as to maintain the connection.

Radio Interference

Be Careful

ZDUE-GPRS-MUCs and ZDUE-DC-MUCs are Class A devices. These devices can cause radio interference in residential areas; in this case, the operator may be required to take the necessary measures.

Firmware with Open Source GPL/LGPL

The ZDUE-MUC device firmware contains open-source software under GPL/LGPL conditions. According to Section 3b in the GPL and Section 6b in the LGPL, we offer you the opportunity of downloading the source code. You will find the source code on the internet at www.neuhaus.de of the pages on MUC Communication modules.

The licensing conditions for the open-source software can also be found with the source code in the download file.

Firmware with OpenBSD

The ZDUE-MUC device firmware includes parts of OpenBSD software. The use of OpenBSD software requires the printing of the following copyright notice:

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1 Intended Use

Introduction

Driven by social requirements for the improved efficiency in the use of energy and the resulting need for the prompt collection and evaluation of usage data, the concept of the MUC controller was developed by different bodies and described in the MUC specifications of the Forum for Network Technology and Network Operation (FNN).

MUC stands for Multi-Utility-Communication.

The MUC controller is a communications device, which can be allocated to one or more households and which is, via the WAN interface, either directly connected with a central system or, if Power Line Communication (PLC) is used, with a MUC data concentrator.

The MUC data concentrator combines several MUC controllers via Power Line Communication, e.g. MUC controllers connected with a central system via e.g. GPRS.

General information on the discussion and on the MUC concept can be found in the MUC specifications of the Forum for Network Technology and Network Operation (FNN).

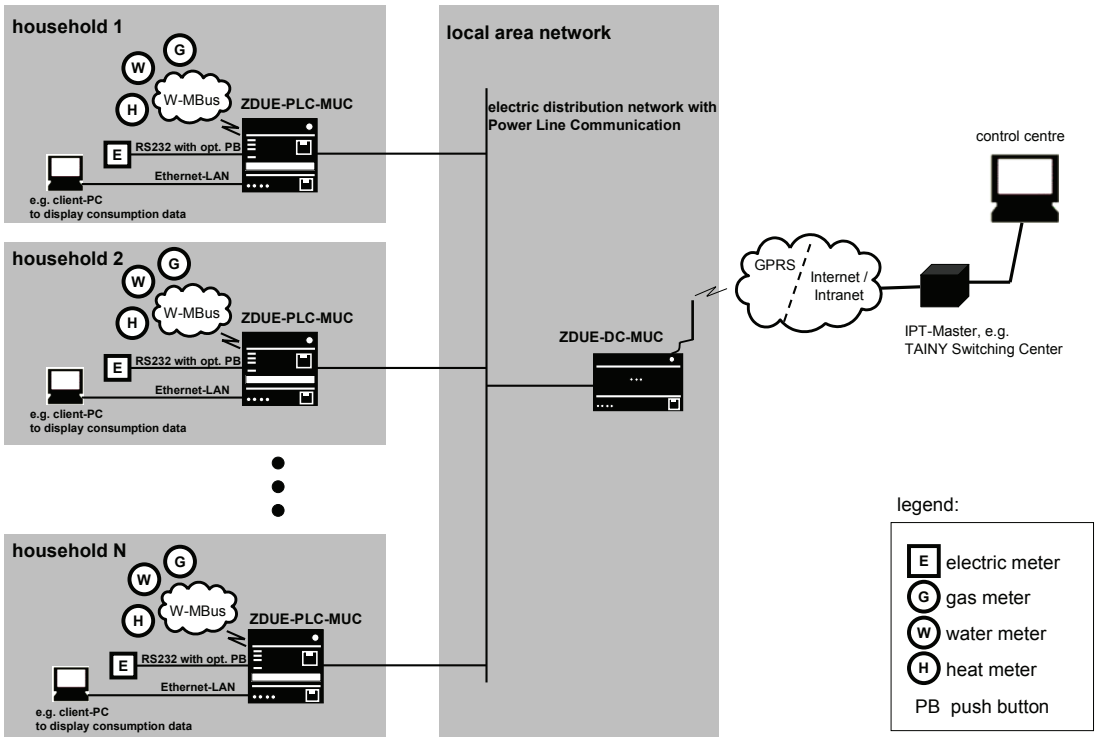
Application

One of the MUC controller’s main features is the local collection of usage data from such different energy sources and resources as electricity, gas, water and heating in a household and the transmission of the data collected via a central system to one or more control centers via standard communications interfaces.

Topologies

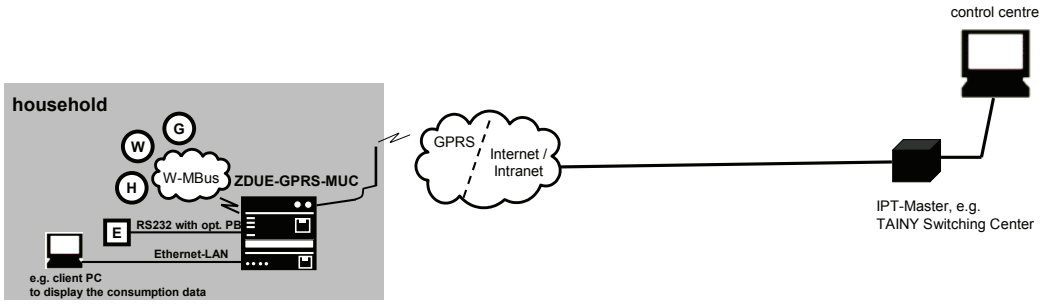
ZDUE-PLC-MUC and ZDUE-DC-MUC

The ZDUE-PLC-MUC is a MUC controller with a PLC interface. It uses Power Line Communication (PLC) via the power line to communicate with a MUC data concentrator. The ZDUE-DC-MUC is a MUC data concentrator. It uses GPRS to communicate on the WAN interface to the central system.



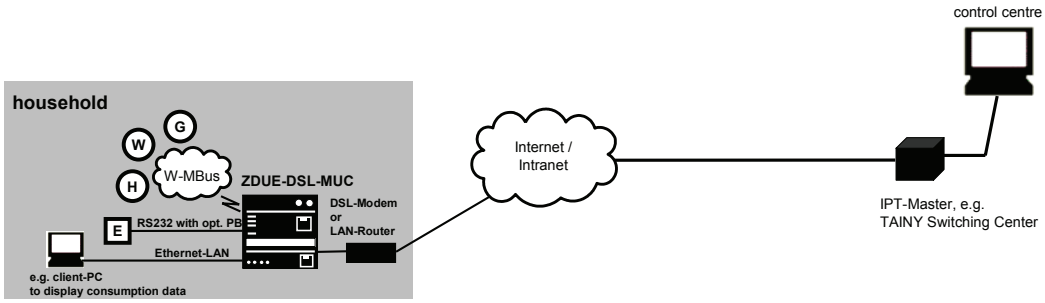
ZDUE-GPRS-MUC

The ZDUE-GPRS-MUC is a MUC controller with a GPRS interface. It uses GPRS on the WAN interface to the central system.



ZDUE-DSL-MUC

The ZDUE-DSL-MUC is a MUC controller with a LAN interface to the connection to a router or to a DSL modem. It uses an intranet or the internet on the WAN interface to the central system.



ZDUE-MUC Operative Tasks

Forwarding messages

The ZDUE-MUC receives messages from devices connected via its WAN interface or via its local interfaces and forwards these messages to the addressed devices.

In this way, it enables communication between devices either directly or indirectly connected to it.

Collecting data

The ZDUE-MUC receives messages from sensors connected via its local interfaces and stores these messages cyclically or event-controlled in data collectors. This data can include measured values or status words from the sensors.

Providing data

The ZDUE-MUC communicates all the usage data and status information collected to other devices in the system, e.g. a central system connected via the WAN interface or a locally connected customer display.

The data is transmitted as requested (pull operation) or periodically as spontaneous message (push operation).

Protecting meter data and operating parameters

The ZDUE-MUC protects the meter data it stores and the operating parameters from unauthorized access by checking user names and passwords.

Providing the date and time

On request, the ZDUE-MUC transmits the date, time (UTC) and the difference to local time.

ZDUE-MUC System Tasks

Establishing and maintaining connections

The ZDUE-MUC uses its interfaces to independently establish the connections to the devices connected and/or is able to receive messages from the devices and maintains this ability to communicate.

Getting and keeping the exact time

The ZDUE-MUC gets an exact time from an external time server and keeps this time itself even if the connection to the external time server occasionally fails.

Managing and providing the list of recognized sensors and actuators

The ZDUE-MUC manages a list of sensors and actuators from which the ZDUE-MUC has received messages during the last hours and provides this list on request (pull) or as a spontaneous message (push) to other devices.

Any devices connected to the ZDUE-MUC can be added to the list of the ZDUE-MUC recognized sensors and actuators to visualize all the devices that are connected.

Managing and providing the list of activated sensors and actuators

The ZDUE-MUC manages a list of sensors and actuators that the ZDUE-MUC takes care of (i.e. that are activated for this ZDUE-MUC), and provides a list of pull or push messages to other devices.

Keeping and making available the MUC status word and MUC operation logbook

The ZDUE-MUC indicates its current operating status in a status word. It keeps an operation logbook in which important operating events are recorded. The status word and operating logbook can be accessed via SML request.

Keeping and making available the meter logbook

The ZDUE-MUC keeps a meter logbook for each sensor or actuator it manages based on its status word and communication status.

These meter logbooks can be accessed via SML request.

Identifying, documenting, eliminating functional errors

The ZDUE-MUC is able to recognize its own functional errors or communication failures, makes a note of any errors or failures it has registered in the MUC operating logbook and is equipped with methods for restoring complete operational readiness.

Parameterization using OBIS-T codes

The ZDUE-MUC can be parameterized via SML message via the customer interface and the WAN interface using OBIS-T codes.

Update of the ZDUE-MUC firmware

The ZDUE-MUC allows the update of its own firmware via SML message, or if possible, also the update of the communications modules used in the ZDUE-MUC.

2 Steps to Initial Operation

2.1 ZDUE-GPRS-MUC

To start up the ZDUE-GPRS-MUC for the first time, please proceed as follows:

Step		Chapter
1.	First, please familiarize yourself with the prerequisites for the operation of the ZDUE-GPRS-MUC.	3
2.	Then, please read all the safety information and other notes at the beginning of this User Manual very carefully and adhere strictly to this information.	
3.	Please also make yourself familiar with the operating elements, connections and operating displays of the ZDUE-GPRS-MUC.	3.4 and 5
4.	Insert the SIM card into the device.	4.1
5.	Install the ZDUE-GPRS-MUC at the device.	3.4
6.	Connect a PC with a software program designed to parameterize a ZDUE-GPRS-MUC, e.g. the ZDUE-MUC configuration software, to the customer/service interface of the ZDUE-GPRS-MUC,	7
7.	Parameterize the ZDUE-GPRS-MUC to meet your requirements.	7 to 19

2.2 ZDUE-PLC-MUC

To start up the ZDUE-PLC-MUC for the first time, please proceed as follows:

Step		Chapter
1.	First, please familiarize yourself with the prerequisites for the operation of the ZDUE-PLC-MUC.	3
2.	Then, please read all the safety information and other notes at the beginning of this User Manual very carefully and adhere strictly to this information.	
3.	Please also make yourself familiar with the operating elements, connections and operating displays of the ZDUE-PLC-MUC.	3.4 and 5
4.	Install the ZDUE-PLC-MUC at the device.	3.4
5.	Connect a PC with a software program designed to parameterize a ZDUE-PLC-MUC, e.g. the ZDUE-MUC configuration software, to the customer/service interface of the ZDUE-PLC-MUC,	7
6.	Parameterize the ZDUE-PLC-MUC to meet your requirements.	7 to 19

2.3 ZDUE-DC-MUC

To start up the ZDUE-DC-MUC for the first time, please proceed as follows:

Step		Chapter
1.	First, please familiarize yourself with the prerequisites for the operation of the ZDUE-DC-MUC.	3
2.	Then, please read all the safety information and other notes at the beginning of this User Manual very carefully and adhere strictly to this information.	
3.	Please also make yourself familiar with the operating elements, connections and operating displays of the ZDUE-DC-MUC.	3.4 and 5
4.	Insert the SIM card into the device.	4.1
5.	Install the ZDUE-DC-MUC.	3.4
6.	Connect a PC with a software program designed to parameterize a ZDUE-DC-MUC, e.g. the ZDUE-MUC configuration software, to the customer/service interface of the ZDUE-DC-MUC,	7
7.	Parameterize the ZDUE-DC-MUC to meet your requirements.	7 to 19

2.4 ZDUE-DSL-MUC

To start up the ZDUE-DSL-MUC for the first time, please proceed as follows:

Step		Chapter
1.	First, please familiarize yourself with the prerequisites for the operation of the ZDUE-DSL-MUC.	3
2.	Then, please read all the safety information and other notes at the beginning of this User Manual very carefully and adhere strictly to this information.	
3.	Please also make yourself familiar with the operating elements, connections and operating displays of the ZDUE-DSL-MUC.	3.4 and 5
4.	Install the ZDUE-DSL-MUC at the device.	3.4
5.	Connect a PC with a software program designed to parameterize a ZDUE-DSL-MUC e.g. the ZDUE-MUC configuration software, to the customer/service interface of the ZDUE-DSL-MUC,	7
6.	Parameterize the ZDUE-DSL-MUC to meet your requirements.	7 to 19

3 Prerequisites for Operation

3.1 ZDUE-GPRS-MUC

In order to operate the ZDUE-GPRS-MUC, the following components and information must be available and the following prerequisites met:

230V power supply

The ZDUE-GPRS-MUC requires a single-phase 230V power supply for its operation.

See Chapter 4.9

GSM/GPRS antenna

An antenna tuned to the frequency bands of the GSM network operator you have selected: 900 MHz or 1800 MHz. Please use only those antennas that are available as accessories for the ZDUE-GPRS-MUC.

See Chapter 4.5

W-MBus antenna

An antenna tuned to the W-MBus frequency band: 868 MHz. Please use only those antennas that are available as accessories for the ZDUE-GPRS-MUC.

See Chapter 4.4

SIM card

A SIM card from the GSM network operator selected.

PIN

The PIN for the SIM card

GPRS activation

The SIM card must have been activated by your GSM network operator.

The GPRS access data must be available:

- Access Point Name (APN)
- User name
- Password

CSD 9600 bps activation

The SIM card must be activated for CSD service by your GSM network operator if you want to use the ZDUE-GPRS-MUC in GSM operation. See Chapter 8.2.

3.2 ZDUE-PLC-MUC

In order to operate the ZDUE-PLC-MUC, the following components and information must be available and the following prerequisites met:

230V power supply

The ZDUE-PLC-MUC requires a single-phase 230V power supply for its operation.

The power supply is used to supply the ZDUE-PLC-MUC as well as for PLC communication.

See Chapter 4.9

W-MBus antenna

An antenna tuned to the W-MBus frequency band: 868 MHz. Please use only those antennas that are available as accessories for the ZDUE-PLC-MUC.

See Chapter 4.4

3.3 ZDUE-DC-MUC

In order to operate the ZDUE-DC-MUC, the following components and information must be available and the following prerequisites met:

230V power supply

The ZDUE-DC-MUC requires a three-phase 230V power supply for its operation.

The connection is used to supply the ZDUE-DC-MUC (single-phase) as well as for PLC communication (three-phase).

See Chapter 4.9

GSM/GPRS antenna

An antenna tuned to the frequency bands of the GSM network operator you have selected: 900 MHz or 1800 MHz. Please use only those antennas that are available as accessories for the ZDUE-DC-MUC.

See Chapter 4.5

SIM card

A SIM card from the selected GSM network operator.

PIN

The PIN for the SIM card

GPRS activation

The SIM card must be activated for GPRS by your GSM network operator.

The GPRS access data must be available:

- Access Point Name (APN)
- User name
- Password

CSD 9600 bps activation

The SIM card must be activated for CSD service by your GSM network operator if you want to use the ZDUE-DC-MUC in GSM operation, see Chapter 8.2.

3.4 ZDUE-DSL-MUC

In order to operate the ZDUE-DSL-MUC, the following components and information must be available and the following prerequisites met:

230V power supply

The ZDUE-DSL-MUC requires a single-phase 230V power supply for its operation.

See Chapter 4.9

LAN connection or DSL modem with DSL connection

The ZDUE-DSL-MUC requires a connection to an Ethernet-LAN with a connection to the internet or a DSL modem with access to the internet via an internet service provider for its operation.

See Chapter 4.11

W-MBus antenna

An antenna tuned to the W-MBus frequency band: 868 MHz. Please use only those antennas that are available as accessories for the ZDUE-DSL-MUC.

See Chapter 4.4

4 Installation and Deinstallation

4.1 Inserting SIM card (only for ZDUE-GPRS-MUC and ZDUE-DC-MUC)

Inserting the SIM card in the ZDUE-GPRS-MUC

The slot in which you have to insert the SIM card is located on the right-hand side of the enclosure of the ZDUE-GPRS-MUC.

Insert the SIM card with the gold-plated contacts facing down into the SIM card slot of the ZDUE-GPRS-MUC until the SIM card clicks into place.

If you would like to remove the SIM card, press it gently into the ZDUE-GPRS-MUC slot. The SIM card holder will release the card so that it protrudes slightly out of the enclosure and you can pull it out.

Inserting the SIM card into ZDUE-DC-MUC

The slot to insert the SIM card is located on the top side of the ZDUE-DC-MUC.

Insert the SIM card with the gold-plated contacts facing down into the SIM card slot of the ZDUE-DC-MUC until the SIM card clicks into place.

If you would like to remove the SIM card, press it gently into the ZDUE-DC-MUC slot. The SIM card holder will release the card so that it protrudes slightly out of the enclosure and you can pull it out.

4.2 Individual installation on top hat rail

ZDUE-GPRS-MUC, ZDUE-DSL-MUC, ZDUE-PLC-MUC and ZDUE-DC-MUC are designed to be installed on top hat rails according to DIN EN 50022.

Warning:

When in operation, the ZDUE-GPRS-MUC, ZDUE-DSL-MUC, ZDUE-PLC-MUC and ZDUE-DC-MUC must be covered by a plate or an enclosure that offers sufficient protection against contact with dangerous voltages. Only the raised front area with the operating displays, customer interfaces and keypad may be touched directly.

4.3 Deinstallation from the top hat rail

To deinstall the ZDUE-GPRS-MUC, ZDUE-DSL-MUC, ZDUE-PLC-MUC or ZDUE-DC-MUC, first disconnect all the connection cables from the device. Insert a flat-headed screwdriver into the slot of the opening for the top hat rail bracket and turn the screwdriver to release the top hat rail bracket.

4.4 Connecting the W-MBus antenna (ZDUE-MUC except for ZDUE-DC-MUC)

The connection for the W-MBus antenna is located on the top of the enclosure for the ZDUE-GPRS-MUC, the ZDUE-DSL-MUC or the ZDUE-PLC-MUC.

The Fakra-C connection is blue and labeled with “W-MBus”.

Connect the antenna used with the Fakra jack in the ZDUE-GPRS-MUC, the ZDUE-DSL-MUC or the ZDUE-PLC-MUC.

The antenna used must have an impedance of approx. 50 ohms. It must be tuned into the 868 MHz ISM radio waveband.

The adjustment (VSWR) of the antenna must be 1:2,5 or better. The operation of the ZDUE-GPRS-MUC, the ZDUE-DSL-MUC and the ZDUE-PLC-MUC is permissible according to the European R&TTE Directive with omni-directional antennas that do not exceed a gain of 0dBm.

Warning:

Use only those antennas available in the ZDUE-MUC accessory program. Other antennas can have a negative effect on the product attributes or even cause defects.

Attention:

When the antenna is installed for the W-MBus in the ZDUE-MUC-GPRS, as great a distance as possible should be kept to the GSM/GPRS antenna. Make sure that you do not place the two antennas directly beside or above one another. That could significantly impair the W-MBus reception.

Attention:

Good signal strength does not always mean good transmission and reception quality. In addition to signal strength, the quality can also be affected by such electromagnetic phenomena as reflection and fading. The signal quality and with that, the stability of the connections, can vary considerably within an area of just a few centimeters.

Carefully follow the installation and operating instructions provided with the antenna used.

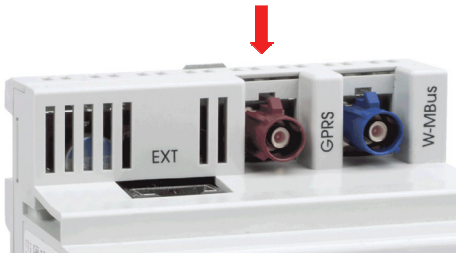
Warning:

When an antenna is installed outdoors, it must be grounded to protect it from being struck by lightning. This work must be done by a qualified technician.

Please note the warning information provided for the installation of antennas outdoors at the beginning of this document.

4.5 Connecting the GSM/GPRS antenna (ZDUE-GPRS-MUC; ZDUE-DC-MUC)

The connection for the GSM/GPRS antenna is located at the top of the enclosure of the ZDUE-GPRS-MUC.



The Fakra-D connection is red and labeled with “GPRS”.

Connect the antenna used with the Fakra jack on the ZDUE-GPRS-MUC or the ZDUE-DC-MUC.

The antenna used must have an impedance of approx. 50 ohms. It must be adjusted for GSM 900MHz and DCS 1800MHz.

The adjustment (VSWR) of the antenna must be 1:2, 5 or better. The operation of the ZDUE-GPRS-MUC and the ZDUE-DC-MUC is permissible according to the European R&TTE Directive with omni-directional antennas that do not exceed a gain of 0dBm.

Warning:

Use only those antennas available in the ZDUE-GPRS-MUC and the ZDUE-DC-MUC accessory programs. Other antennas can have a negative effect on the product attributes or even cause defects.

When installing the antenna, make sure that the signal quality is good enough. Use the operation display of the ZDUE-GPRS-MUC or the ZDUE-DC-MUC, which shows you the signal strength. Make sure that there are no large metal objects (e.g. reinforced concrete) near the antenna.

Attention:

Good signal strength does not always mean good transmission and reception quality. In addition to signal strength, the quality can also be affected by such electromagnetic phenomena as reflection and fading. The signal quality and with that, the stability of the connections, can vary considerably within an area of just a few centimeters.

Carefully follow the installation and operating instructions provided with the antenna used.

Warning:

When an antenna is installed outdoors, it must be grounded to protect it from being struck by lightning. This work must be done by a qualified technician.

Please note the warning information provided for the installation of antennas outdoors at the beginning of this document.

4.6 eHZ interface (not ZDUE-DC-MUC)

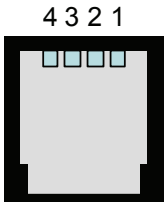
The eHZ interface is located on the bottom of the ZDUE-GPRS-MUC, the ZDUE-DSL-MUC or the ZDUE-PLC-MUC.

Connect an electronic household meter (from FNN specs Version 1.03) to the eHZ interface. The connection is made indirectly to the rear optical data interface of the eHZ using an optical adapter. The electronic household meter must use the SML protocol according to specification 1.03 for communication purposes.

The eHz interface is a serial interface with a V.28 level.

The baud rate is set to a fixed rate of 9600 bps, The data format is 8N1.

Pin allocation



RJ-10 (4P/4C)

Pin allocation of the RJ-10 jack:

1 – Auxiliary power supply

2 – GND

3 – TX (data to meter)

4 – RX (data from meter)

The auxiliary power supply signal can be used to supply the optical adapter with power. The signal has a level of V.28 and delivers at least 25mA.

4.7 I3 Customer and Service Interface

The I3 customer and service interface is located on the front of the ZDUE-GPRS-MUC, the ZDUE-DSL-MUC and the ZDUE-MUC-PLC behind a protective cover.

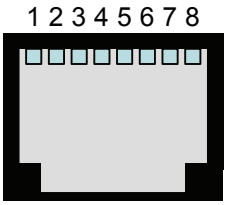
Use a pointed object to help you open the protective covering.

On the ZDUE-DC-MUC, the service interface is located on the bottom right:

To request measurement data, to configure the system and to operate it, connect a MUC-compatible visualization device, a portable data collection device or a PC equipped with the corresponding software to the customer and service interface. Version 1.03 of the SML protocol is used on the customer and service interface.

To connect up to the customer and service interface, you can use a CAT-5 patch cable or a CAT-5 crossover cable.

Pin allocation



RJ-45 (8P/8C)

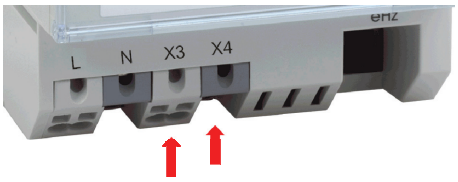
Pin allocation of the RJ-45 jack:

1 – TD+ (data from MUC)
2 – TD- (data from MUC)
3 – RD+ (data from MUC)
4 – NC (not connected)
5 – NC (not connected)
6 – RD- (data to MUC)
7 – NC (not connected)
8 – NC (not connected)

The customer and service interface is a 10/100-MBus Ethernet interface with auto crossover.

4.8 Gate input / Gate output (not ZDUE-DC-MUC)

The X3 gate output and the X4 gate intput jacks are located in the lower connection area of the ZDUE-GPRS-MUC, the ZDUE-DSL-MUC and the ZDUE-PLC-MUC.

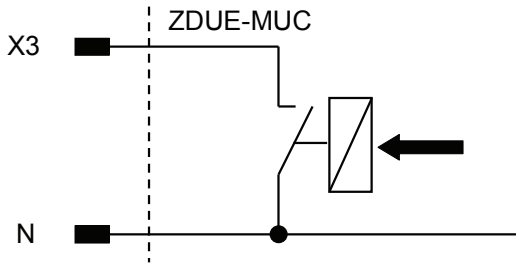


These connections are spring-clip terminals. The following requirements apply for the lead-in lines:

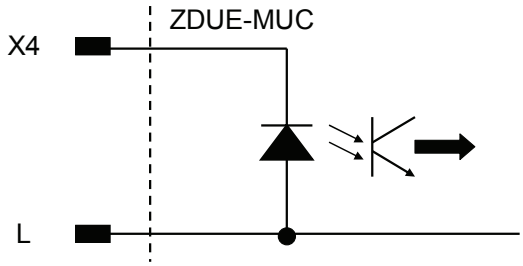
0.75mm² to 2.5mm², steep, 8mm bared

The X3 gate output and the X4 gate intput are reserved for future applications and are not currently supported by the ZDUE-MUC software.

Circuitry gate output:



Circuitry gate input:



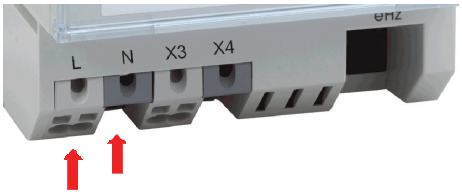
Warning:

Pay careful attention to the safety precautions at the beginning of this document.

The space between antennas/data line and other lines carrying dangerous voltage must be at least 10 mm.

4.9 Power supply (not ZDUE-DC-MUC)

The connections L and N for the power supply for the ZDUE-GPRS-MUC, the ZDUE-DSL-MUC and the ZDUE-PLC-MUC are located on the bottom left-hand side of the device:



Connect an alternating current of **230 volts (-10% / +10%)** to the power supply.

The following requirements apply for the lead-in lines:

0.75mm² to 2.5mm², steep, 8mm bared

Warning:

Pay careful attention to the safety precautions at the beginning of this document.

The space between antennas/data line and other lines carrying dangerous voltage must be at least 10 mm.

In the ZDUE-PLC-MUC, the connection to the power supply (L; N) also serves as communication via the power supply network (Power Line Communication – PLC).

4.10 Power supply (ZDUE-DC-MUC only)

The connections for the power supply in the ZDUE-DC-MUC are located in the connection strip on the lower, left-hand side:

Connect to L1 and N for an alternating current of **230 volts (-10% / +10%)** for the power supply.

The connections are screw terminals. The following requirements apply for the lead-in lines:

0.75mm² to 2.5mm², steep, 10mm bared

Warning:

Pay careful attention to the safety precautions at the beginning of this document.

The space between antennas/data line and other lines carrying dangerous voltage must be at least 10 mm.

In the ZDUE-DC-MUC, the connection to the power supply (L; N) also serves as communication via the power supply network (Power Line Communication – PLC).

For communication via PLC, the ZDUE-DC-MUC must also be connected to the L2 and L3 phases.

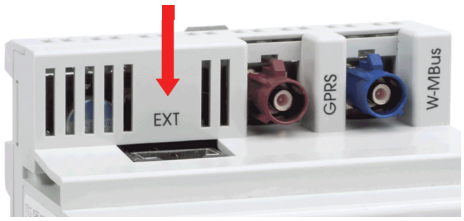
The connections are screw terminals. The following requirements apply for the lead-in lines:

0.75mm² to 2.5mm², steep, 10mm bared

4.11 EXT extension interface

ZDUE-DSL-MUC

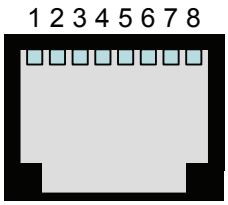
The EXT extension interface in the ZDUE-DSL-MUC is used to connect the LAN or a DSL modem.



Use the EXT extension interface to connect the ZDUE-DSL-MUC to a LAN or a DSL modem.

You can use either a CAT-5 patch cable or a CAT-5 crossover cable to connect the device.

Pin allocation



RJ-45 (8P/8C)

Pin allocation in the RJ-45 jack:

1 – TD+ (data from MUC)
2 – TD- (data from MUC)
3 – RD+ (data to MUC)
4 – NC (not connected)
5 – NC (not connected)
6 – RD- (data to MUC)
7 – NC (not connected)
8 – NC (not connected)

The customer and service interface is a 10/100-MBus Ethernet interface with auto crossover.

Other ZDUE-MUCs

For all the other ZDUE-MUCs, the extension interface is reserved for future applications.

5 Operating Displays

5.1 ZDUE-GPRS-MUC operating displays

The ZDUE-GPRS-MUC is equipped with three light diodes on its front panel to indicate the current operating status.

LED	Status	Meaning
WAN	Off	No power supply
	Short flashing	Establishing GPRS connection
	Even flashing	GSM call active
	On, with short interruptions	GPRS logged in
	On	IPT connection completed
SIGNAL	Off	Not logged into the GSM network
	Short flashing	GSM signal strength poor (CSQ < 6)
	Even flashing	GSM signal strength medium (CSQ= 6..10)
	On, with short interruptions	GSM signal strength good (CSQ=11-18)
	On	GSM signal strength very good (CSQ > 18)
METER	Short flashing	Reception of a message on the eHZ interface
	Long lit up	Reception of a message on the W-MBus interface
SIGNAL	Alternate flashing	Initialization / Loading functions
METER	Simultaneous flashing	Error

5.2 ZDUE-DSL-GPRS operating displays

The ZDUE-DSL-MUC is equipped with three light diodes on its front panel to indicate the current operating status.

LED	Status	Meaning
WAN	Off	No power supply
	Short flashing	Waiting for IP address (DSL or DHCP)
	Even flashing	Fixed IP address
	On, with short interruptions	Dynamic IP address received (DSL or DHCP)
	On	IPT connection completed
SIGNAL	Off	No Ethernet link identified
	On	Ethernet link identified
METER	Short flashing	Reception of a message on the eHZ interface
	Long lit up	Reception of a message on the W-MBus interface
SIGNAL	Alternate flashing	Initialization / Loading functions
METER	Simultaneous flashing	Error

5.3 ZDUE-PLC-MUC operating displays

The ZDUE-PLC-MUC is equipped with three light diodes on its front panel to indicate the current operating status.

LED	Status	Meaning
WAN	Off	No power supply
	Short flashing	Connection at data concentrator
	On	Connected at data concentrator
SIGNAL	Short flashing	Reception of a message via PLC
METER	Short flashing	Reception of a message at the eHZ interface
	Long lit up	Reception of a message at the W-MBus interface
SIGNAL	Alternate flashing	Initialization / Loading functions
METER	Simultaneous flashing	Error

5.4 ZDUE-DC-MUC operating displays

The ZDUE-DC-MUC is equipped with three light diodes on its front panel to indicate the current operating status.

LED	Status	Meaning
WAN	Off	No power supply
	Short flashing	Establishing GPRS connection
	Even flashing	GSM call active
	On, with short interruptions	GPRS logged in
	On	IPT connection completed
SIGNAL	Off	Not logged into the GSM network
	Short flashing	GSM signal strength poor (CSQ < 6)
	Even flashing	GSM signal strength medium (CSQ= 6..10)
	On, with short interruptions	GSM signal strength good (CSQ=11-18)
	On	GSM signal strength very good (CSQ > 18)
METER	Short flashing	Reception of a message via PLC
SIGNAL	Alternate flashing	Initialization / Loading functions
METER	Simultaneous flashing	Error

6 Customer / Service Interface

Function

The customer/service interface is used to connect a visualization device to show usage in the household. For the ZDUE-GPRS-MUC and the ZDUE-PLC-MUC, the usage data received by the sensors can be accessed via the customer/service interface. The control center can also use this interface to send messages to the visualization device insofar as it has previously sent a message (e.g. request for device identification) to the ZDUE-MUC.

The customer/service interface is also used to set the parameters for the ZDUE-GPRS-MUC and the ZDUE-PLC-MUC. That is all the customer/service interface is used for for the ZDUE-DC-MUC.

Data can be exchanged directly via the customer/service interface with the ZDUE-MUC or other components in the MUC measuring system.

The data is exchanged via SML protocol and SML-T protocol using OBIS and OBIS-T codes.

The internet protocol (TCP/IP) is used on the customer/service interface on the lower protocol layers, whereby the ZDUE-MUC functions as a server.

The service interface is a 10/100-Base-T Ethernet interface.

7 Parameterization

7.1 Overview

The parameters for the ZDUE-MUCs can be set locally using the customer/service interface or by remote via the control center connection.

Parameterization required

The different ZDUE-MUCs require different parameters:

	ZDUE-GPRS-MUC	ZDUE-DSL-MUC	ZDUE-PLC-MUC	ZDUE-DC-MUC
GSM	X			X
GPRS	X			X
LAN / DSL		X		
PLC			X	X
IP telemetry	x	X		X
NTP time server	X	X		X
Data mirroring	X	X	X	
Data collector	X	X	X	
Push mode	X	X	X	X[1]

Parameterization using OBIS-T and SML

The parameters can be set via the control center connection or the service interface using OBIS/OBIS-T codes and parameters, which are transmitted via the SML protocol. To do so, a software tool is required, which is part of the control center software or a portable data collection device, or can also be special parameterization software.

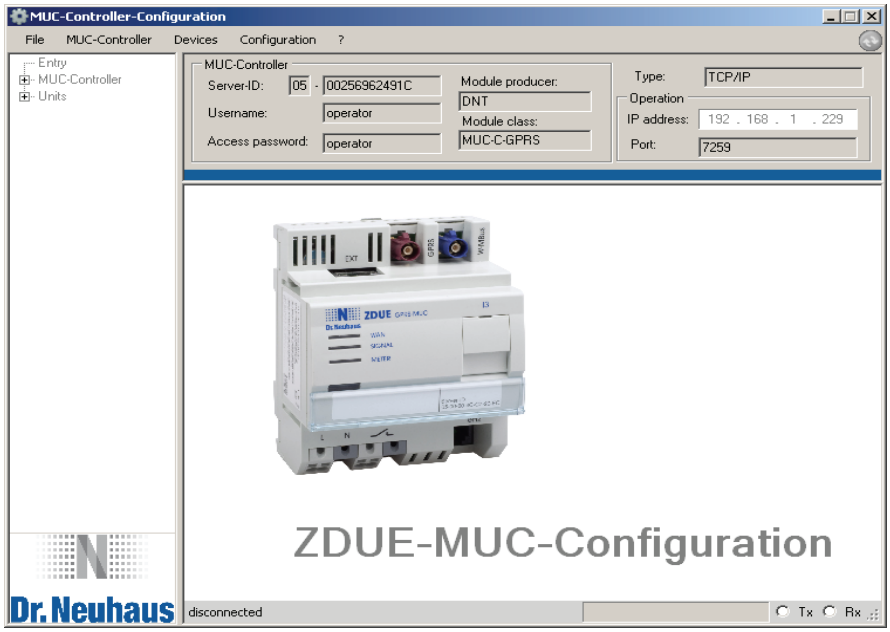
The Technical Reference chapter lists the data structures and parameters required to parameterize a ZDUE-MUC, to check on the status and to operate the functions. The basics can be found in the FNN-MUC specifications Version 1.0 and in the SML protocol specifications Version 1.03.

[1] Only for Push for the ZDUE-DC-MUC installation parameters

The functions and parameters of the ZDUE-MUCs are described in Chapters 8 to 19. This is where you will find cross-references to the data structures and parameters used.

7.2 MUC configuration software for parameterization

Dr. Neuhaus offers the MUC configuration software for the parameterization of the ZDUE-MUCs.



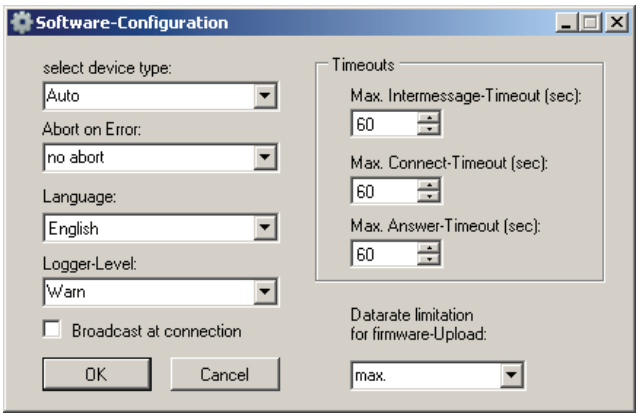
This software can be used to set the parameters of a ZDUE-MUC either locally via the customer/service interface or by remote via the control center connection.

Installation

Start *install.exe* program on the data medium with the MUC configuration software installation to install the parameterization program on a computer. The computer needs Windows XP SP2 or Windows Vista as its operating system.

Follow the instructions provided by the installation assistant.

Settings



Selection of module class

The ZDUE-MUC is available in different module classes:

- MUC controller type GPRS (81 81 C7 82 46 FF)
- MUC controller type LAN/DSL (81 81 C7 82 4F FF)
- MUC controller type PLC (81 81 C7 82 47 FF)
- MUC controller type DC (81 81 C7 82 48 FF)

The MUC configuration software must be set to the module class of the ZDUE-MUC connected.

Automatic – The MUC configuration software asks the ZDUE-MUC connected for its module class and selects the corresponding settings automatically.

MUC-DC, MUC-PLC, MUC-GPRS, MUC-DSL – Manual selection of the module class and setting of the MUC configuration software.

Broadcast at connection

➲ Data structure and parameters, see Chapter 21.24

If this function has been activated (*checkmark* in box), the MUC configuration software searches for ZDUE-MUCs via broadcast and displays the devices found in the Connection menu (See Chapter 7.3).

Abort on error

Determines the behavior of the MUC configuration software should an error occur. Leave it at the default setting.

Language

Selection of the language used for the MUC configuration software.

Logger level

Selection of the scope of information written into the log file of the MUC configuration software. Leave it at the default setting.

Timeouts, limitation of the data rate for firmware update

Different communication parameters for the MUC configuration software. Leave it at the default setting.

7.3 Parameterization using the customer/service interface

The prerequisites for the configuration via the customer/service interface are:

- The computer on which the MUC configuration software is installed
  - must be connected directly to the Ethernet jack of the ZDUE-MUC using a network cable, or
  - must have direct access to the ZDUE-MUC via a network that is connected to the customer/service interface.
- The network adapter of the computer with the MUC configuration software must have the following TCP/IP configuration:

  IP address: **192.168.1.100**

  Subnet mask: **255.255.255.0**

  In place of the IP address **192.168.1.100**, you can also use other IP addresses from the **192.168.1.x range**. However, you cannot use the IP addresses **192.168.1.229 or 192.168.1.230**.

Preparing Windows settings

For a computer with a Windows operating system, make the settings as follows:

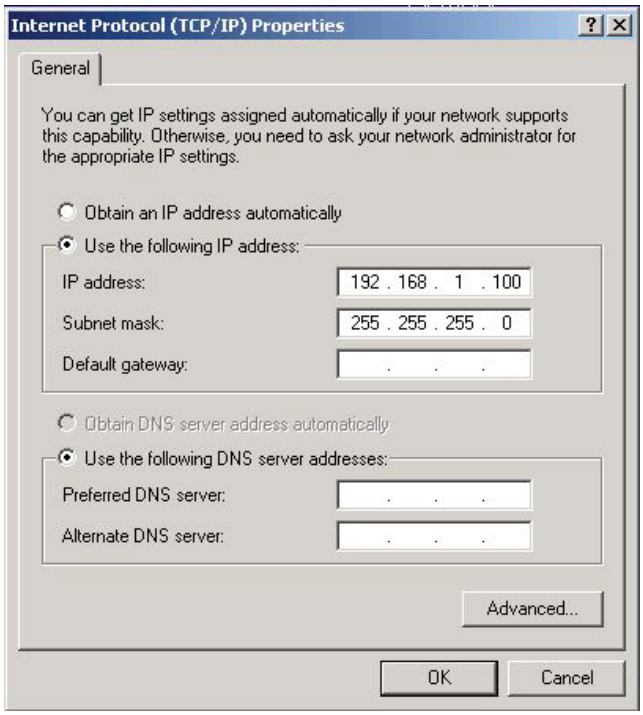
Click *Start, Connect with ..., Show all connections …*

Then click on *LAN connection.* In the *LAN connection attributes* dialog, select the tab marked *General* and mark the *Internet protocol (TCP/IP)* entry. Access *Attributes* by clicking the corresponding button.

The *Internet protocol TCP/IP attributes* window will appear (see Fig. below).

Note:

Where you find the *LAN connection attributes* dialog depends on your Windows settings. If you are unable to find the dialog, use the Windows help function to search for *LAN connection* or *Internet protocol TCP/IP attributes.*


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 1 . 100
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Enter the following values to communicate via the customer/service interface of the ZDUE-MUC:

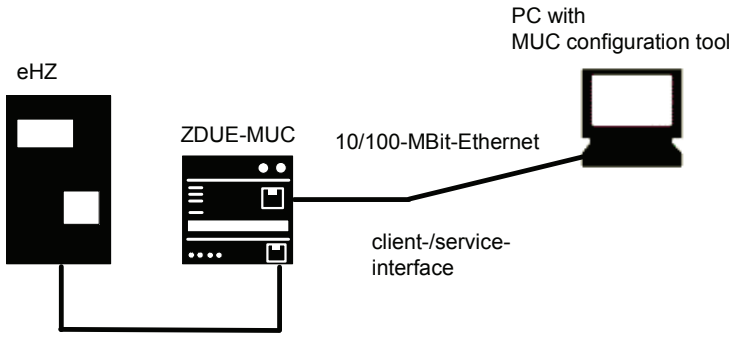
IP address: **192.168.1.100**

Subnet mask: **255.255.255.0**

It is not necessary to select a standard gateway and DNS server.

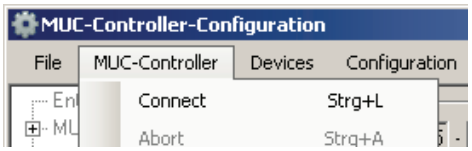
Connection to the service interface

Connect the computer on which the MUC configuration software is installed with the customer/service interface of the ZDUE-MUC (See Chapter 6).



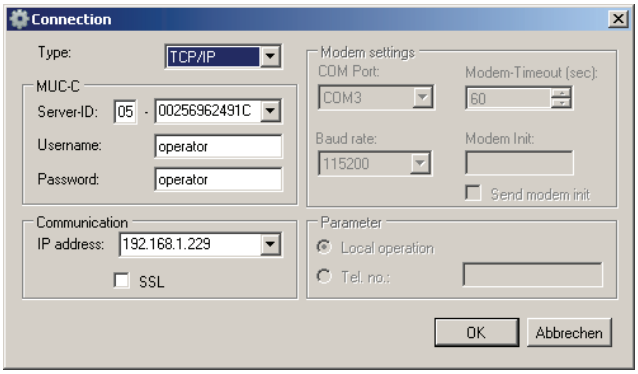
Establishing the connection to the ZDUE-MUC

To establish the connection between the MUC configuration software and the ZDUE-MUC, select the subitem *Connect* in the *MUC Controller* menu.



The *Connection* menu will appear.

To set the parameters using the customer/service interface, select the *TCP/IP* option here.



Server ID

Enter the server ID of the ZDUE-MUC here. Every ZDUE-MUC is clearly identified by its server ID. The server ID is printed on the front panel of the ZDUE-MUC.

The server ID of a MUC controller consists of 2 + 12 digits or letters. No separators are used and the server ID is not case-sensitive (no difference is made between capital and small letters). The MUC configuration software accepts capital letters only.

Example: 05-00604CC71C41

If the *Broadcast at connection* function has been activated in the *Settings* menu, the MUC configuration software will search for any available MUC controllers and ask for their device identification. If MUC controllers respond, you can select their server ID and IP addresses.

Username, access password

Access to the data stored in the ZDUE-MUC and the parameterization is protected by a user name and access passwords. Different users can be differentiated by their different user names and access passwords and can have different access rights (also see Chapter 10).

Enter your user name and your access password here. Depending on what access rights you have, you can then operate the ZDUE-MUC.

IP address

Enter the IP address of the ZDUE-MUC customer/service interface here. ZDUE-MUCs have the following IP addresses as default settings at the customer/service interface:

ZDUE-GPRS-MUC: **192.168.1.229**

ZDUE-DSL-MUC: **192.168.1.229**

ZDUE-PLC-MUC: **192.168.1.229**

ZDUE-DC-MUC: **192.168.1.230**

Also see Chapter 6.

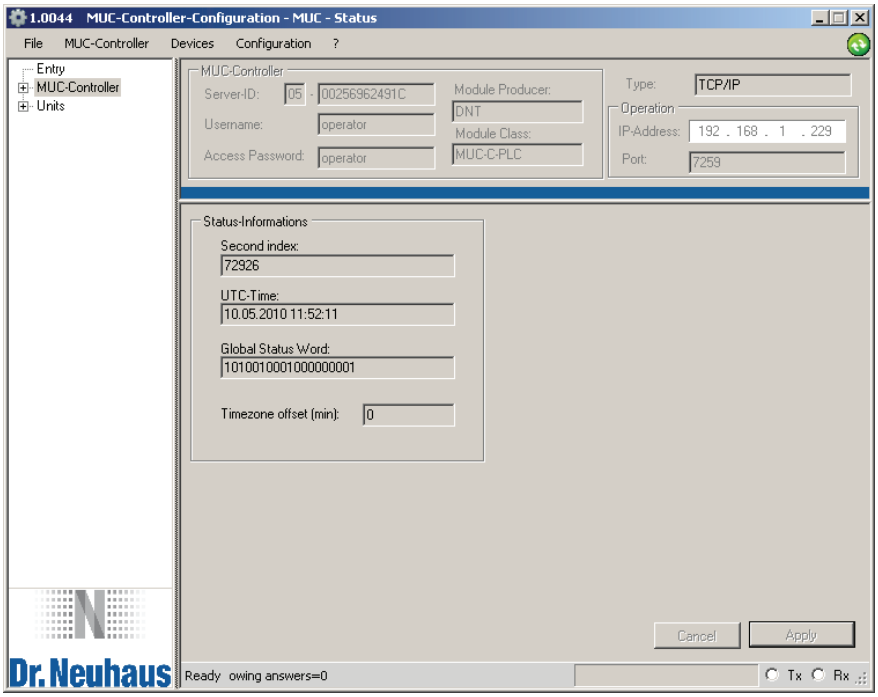
SML uses port 7259.

SSL

Reserved for future applications.

Make connection

Once you have made the settings described in the above, click OK and the connection will be made to the ZDUE-MUC.



Once the connection has been set up, the MUC configuration software will switch to the *MUC Controller* screen.

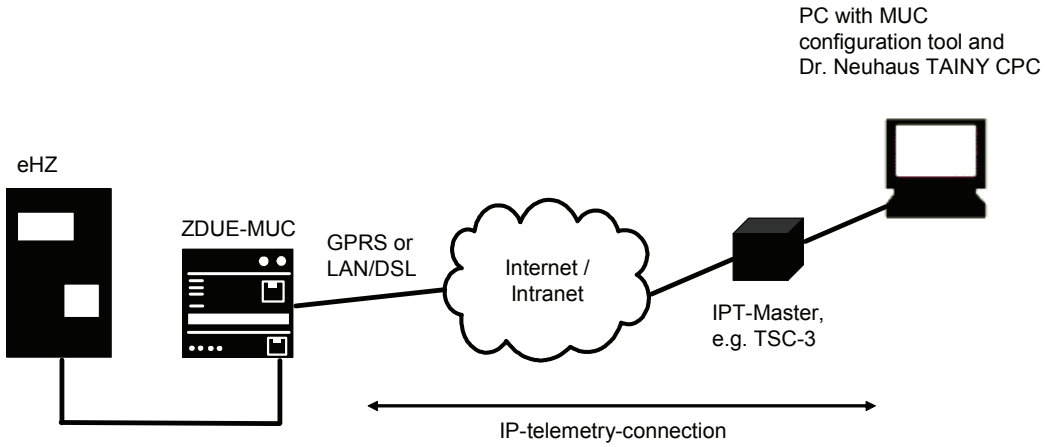
7.4 Parameterization via the control center connection

With the MUC configuration software, the ZDUE-MUC can also be parameterized by remote using the control center connection. There are two alternatives:

- Parameterization using an IP telemetry connection
- Parameterization using a GSM-CSD connection

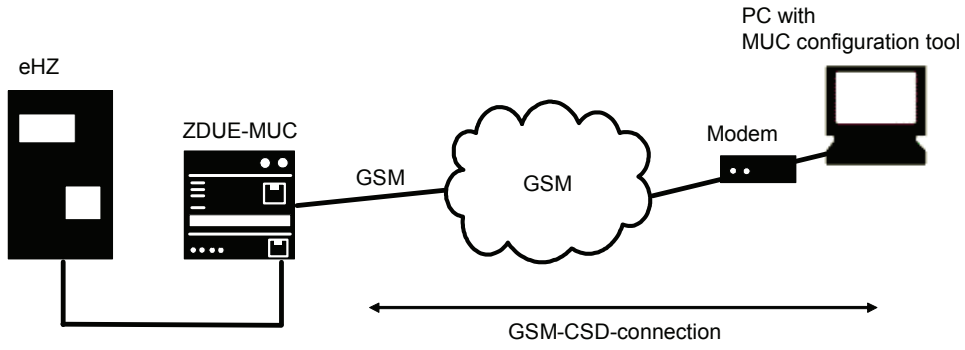
These two alternatives differ from one another in that they use different communication services. As far as the MUC configuration software is concerned, there is no difference between them.

Control center connection via IPT master



To connect the computer with the MUC configuration software with the ZDUE-MUC via an IPT connection, an IPT-COM-Port driver (e.g. TAINY ComPortClient) or an IPT hardware adapter (e.g. TAINY LMOD-S1) is required.

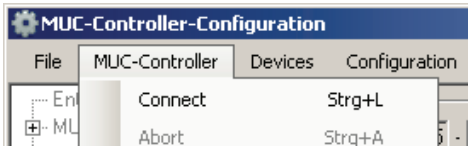
Control center connection via a GSM-CSD connection



To connect the computer with the MUC configuration software with the ZDUE-MUC via a GSM-CSD connection, a PSTN modem or a GSM modem must be connected to the computer.

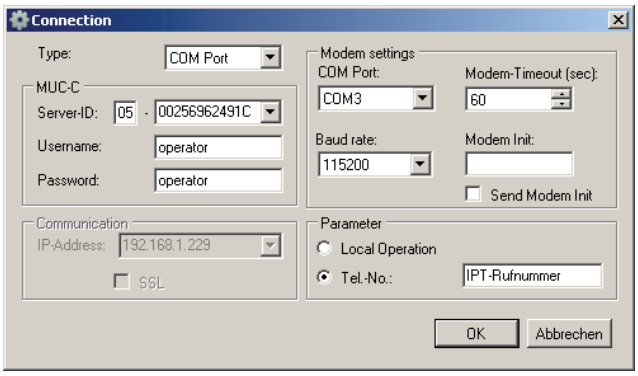
Making the connection to the ZDUE-MUC

To make the connection between the MUC configuration software and the ZDUE-MUC, select the subitem *Connect* in the *MUC Controller* menu.



The *Connection* menu will appear.

To set the parameters using the customer/service interface, select the *COM Port* option here.



Server ID

Enter the server ID of the ZDUE-MUC here. Every ZDUE-MUC is clearly identified by its server ID. The server ID is printed on the front panel of the ZDUE-MUC, also see Addressing.

The server ID of a MUC controller consists of 2 + 12 digits or letters. No separators are used and the server ID is not case-sensitive (no difference is made between capital and small letters). The MUC configuration software automatically converts any small letters entered into capital letters.

Example: 05-00604CC71C41

Username, access password

Access to the data stored in the ZDUE-MUC and the parameterization is protected by a user name and access passwords. Different users can be differentiated by their different user names and access passwords and can have different access rights (also see Chapter 18.1).

Enter your user name and your access password here. Depending on what access rights you have, you can then operate the ZDUE-MUC.

COM Port

Select the COM interface of the computer to be used to communicate with the ZDUE-MUC.

Baud rate

Select the interface speed.

Send modem Init

If you want to operate the ZDUE-MUC by remote via the control center connection, you can enter AT commands here to initialize the modem. The commands are transferred to the modem before the call number if you have set a checkmark for Send modem init.

Call number

For a GSM-CSD connection, enter the call number of the ZDUE-MUC SIM card here, or

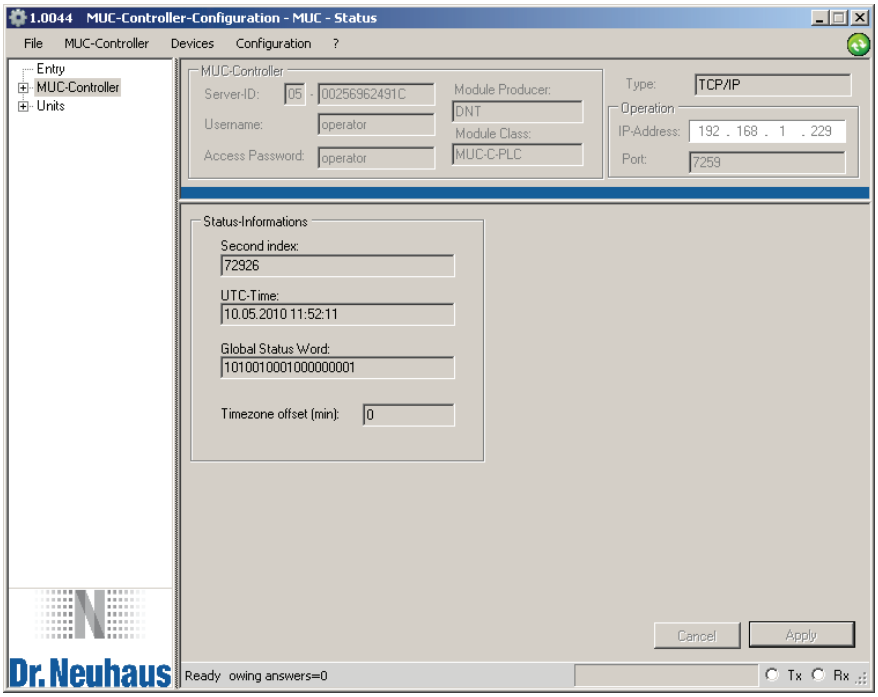
for an IP telemetry connection, the virtual call number of ZDUE-MUC at the IPT master.

SSL

Reserved for future applications.

Make connection

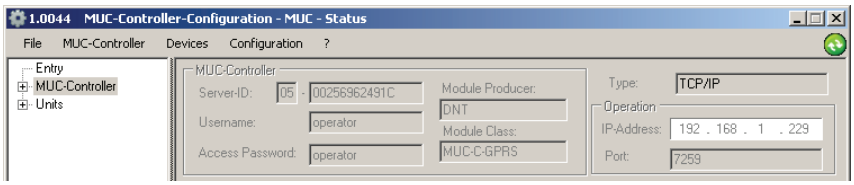
Once you have made the settings described in the above, click OK and the connection will be made to the ZDUE-MUC.



Once the connection has been set up, the MUC configuration software will switch to the *MUC Controller* screen.

7.5 Module class and module producer

MUC configuration software screen



This screen shows details on the current connection between the MUC configuration software and ZDUE-MUC as well as the ZDUE-MUC connected.

Module class

➲ Data structure and parameters, see Chapter 21.24

This indicates the module class of the ZDUE-MUC.

- MUC controller type GPRS (81 81 C7 82 46 FF)
- MUC controller type LAN/DSL (81 81 C7 82 4F FF)
- MUC controller type PLC (81 81 C7 82 47 FF)
- MUC controller type DC (81 81 C7 82 48 FF)

Module producer

➲ Data structure and parameters, see Chapter 21.24

This indicates the FLAG manufacturer code of the ZDUE-MUC.

7.6 Parameterization guide

Prerequisites

You have installed the ZDUE-MUC configuration software on a PC.

The PC is either directly connected with the I3 customer/service interface of the ZDUE-MUC, or there is already a GSM or IPT connection between the PC and the ZDUE-MUC.

You require access rights to make the different settings.

Setting up a control center connection (GPRS)

Step		Chapter
1.	Insert the SIM card into the ZDUE-MUC and install the device.	**3.4**

2.	Parameterize the GSM connection.	**8.2**
3.	Parameterize the GPRS connection.	**8.3**
4.	Parameterize the IP telemetry connection.	**8.4**

Setting up the control center connection (DSL)

Step		Chapter
1.	Parameterize the LAN or DSL connection.	**8.4**
2.	Parameterize the IP telemetry connection.	**8.5**

Setting up the control center connection (PLC)

Step		Chapter
1.	As a rule, there are no settings that need to be made. Install the ZDUE-MUC-PLC.	**3.4**

Activating the time server

Step		Chapter
1.	Optionally, you can also set the time of the time server in the ZDUE-MUC manually. This can be necessary if the control center connection is not set up until later.	**18.2**
2.	Activate the automatic synchronization of the time server.	**9**

Creating a device

Step		Chapter
1.	Create the necessary access rights to create data mirroring for a device.	**10**
2.	Create data mirroring for the device (*Activate device*), regardless of whether the ZDUE-MUC already has contact to this device or not.	**19.1**
3.	Create data collectors corresponding to the registration periods with which measurement values are to be recorded.	**16**
4.	Determine the usage data that is to be recorded for each data collector.	**16**

Creating a push process for the device

Step		Chapter
1.	Create the access rights required to create push events for the device.	**10**
2.	Create the push process for the device.	**17.1**

8 Interface to the Control Center

8.1 Introduction

The ZDUE-MUCs use different transmission technologies for the connection between the MUC measuring equipment and the remote control center.

ZDUE-GPRS-MUC, ZDUE-DC-MUC

The ZDUE-GPRS-MUC and the ZDUE-DC-MUC use GSM radio technology for wireless communication with the remote control center.

It uses the GPRS service (General Packet Radio Service) of the GSM network to set up a connection to the internet or to a private intranet and communicates via these networks.

Additionally, the CSD service (Circuit Switched Data) of the GSM network is also supported for a wireless dial-up connection.

ZDUE-DSL-MUC

The ZDUE-DSL-MUC uses a TCP/IP internet or intranet connection to communicate with the remote control center.

To do so, the ZDUE-DSL-MUC is connected via a router with a LAN that is already connected to the internet, or the ZDUE-DSL-MUC is connected to a DSL modem that has a DSL connection to an internet service provider.

ZDUE-PLC-MUC

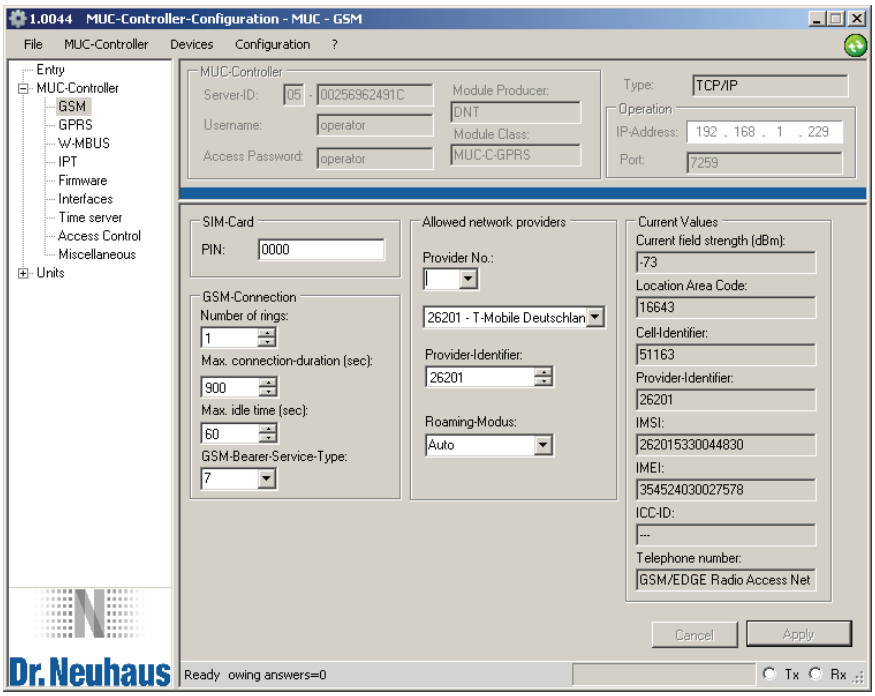
The ZDUE-PLC-MUC uses Power Line Communication via the power network to communicate with the remote control center, whereby the ZDUE-PLC-MUC connects with a ZDUE-DC-MUC via the power line. This PLC data concentrator forwards the data from the ZDUE-PLC-MUC connected via its GPRS connection to the remote control center and vice versa.

8.2 Basic GSM settings and current values

The ZDUE-GPRS-MUC and the ZDUE-DC-MUC are equipped with a GSM wireless modem to enable wireless data communication via GPRS-IP connections or GSM dial-up connections at 9600 bps.

The same basic configuration is required for both types of connections.

Select the GSM option in the MUC configuration software.



SIM card

PIN

➲ Data structure and parameters, see Chapter 21.5

Enter the PIN for your SIM card here. You get the PIN from your network operator.

The ZDUE-GPRS-MUC and the ZDUE-DC-MUC also work with PIN-less SIM cards; in this case, simply leave this input box blank.

You can only enter an incorrect PIN twice in succession. After that, the SIM card will be blocked (PUK status) and can only be reactivated again by entering the PUK. To do that, you need a GSM device that supports the entry of the PUK, e.g. a cell phone. You get the PUK from your GSM network operator.

Default setting: 0000

Allowed network operators

The ZDUE-GPRS-MUC and the ZDUE-DC-MUC can only log into GSM networks that have been activated as the home network or the GSM network of roaming partners by the service provider that issued the SIM card. If the ZDUE-GPRS-MUC or the ZDUE-DC-MUC finds the home network, the devices will log into this network. If the ZDUE-GPRS-MUC and the ZDUE-DC-MUC cannot find the home network, they will search for the networks of the roaming partners.

Roaming mode

➲ Data structure and parameters, see Chapter 21.6

The way in which the ZDUE-GPRS-MUC or the ZDUE-DC-MUC handle the roaming partner networks can be set up with the parameters for the roaming mode:

Mode 0 (SIM): The ZDUE-GPRS-MUC or the ZDUE-DC-MUC work through the list of allowed network operators stored on the SIM card. First, they look for the home network, and then for the roaming partners. The search goes on until one of the networks is found.

Mode 1 (list): The ZDUE-GPRS-MUC or the ZDUE-DC-MUC works through the list of allowed network operators that can be stored manually in the ZDUE-GPRS-MUC or the ZDUE-DC-MUC. The list can contain up to 10 entries. Each entry consists of the operator no. and the operator code. The search goes on until one of the stored networks is found.

Mode 2 (auto): The ZDUE-GPRS-MUC or the ZDUE-DC-MUC works through the list of allowed network operators that can be stored manually in the ZDUE-GPRS-MUC or the ZDUE-DC-MUC (see Mode 1). If none of the stored networks is found, the search expands to include those networks that are stored on the SIM card. The search goes on until one of the stored networks is found.

Default setting: Mode 2

Operator no.

➲ Data structure and parameters, see Chapter 21.5.

Select an entry from the list of allowed network operators.

Operator code

➲ Data structure and parameters, see Chapter 21.6

Allocate an allowed network operator to the operator no. here. The network operator is defined by its operator code, consisting of a combination of MCC and MNC. Select the operator from the list or enter the combination of the MCC and MNC manually.

List of examples:

MCC	MCN	Operator code	Network operator
262	01	26201	T-Mobile (Germany)
262	02	26202	Vodafone (Germany)
262	03	26203	E-PLUS (Germany)
262	07	26207	O2 (Germany)
232	03	23203	T-Mobile (Austria)
232	05	23205	Connect Austria One (Austria)
232	07	23207	Telering (Austria)
232	10	23210	Hutchinson 3 G Austria (Austria)
228	01	22801	Swisscom NATEL (Tele2, 3G Mobile)
228	02	22802	TDC Switzerland AG (Sunrise)
228	03	22803	Orange (Switzerland)

There are lists with the MCC/MCN of the network operators on the internet. Do a search using the keywords: MCC MCN GSM

Default setting: Blank; there are no operator codes that have been entered in the device.

GSM connection

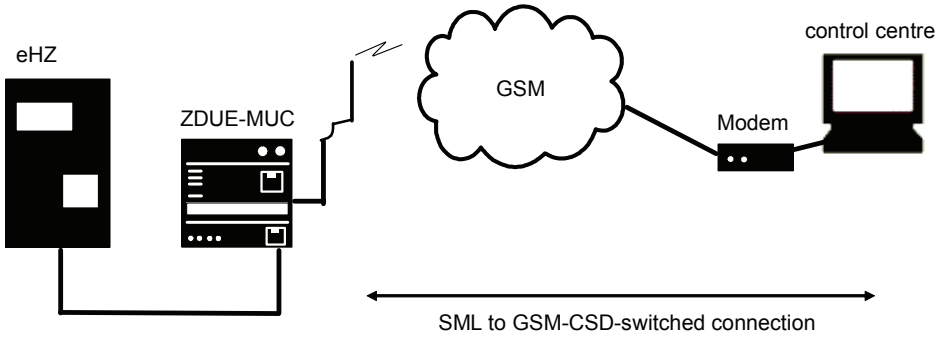
Once the ZDUE-GPRS-MUC or the ZDUE-DC-MUC is ready for operation, the device waits for a CSD call from the control center even when the GPRS-IP connection to the control center is already active. Depending on the parameters set, an incoming call is automatically accepted as a CSD data call. In this case, the incoming call interrupts the GPRS connection. Once the CSD data call is completed, the GPRS connection will be set up again automatically.

The caller must use an analog modem or a GSM modem (CSD) and dial the data call number of the SIM card of the ZDUE-GPRS-MUC or the ZDUE-DC-MUC.

The ZDUE-DC-MUC supports the following CSD operating modes:

- CSD 9600 bps
- RLP; non-transparent

The operating modes are negotiated automatically with the calling modem or the GSM network.



Call answer

➲ Data structure and parameters see Chapter 21.5.

The call answer parameter determines the number of rings after which the ZDUE-GPRS-MUC or the ZDUE-DC-MUC will answer an incoming call.

You can choose between 1 and 10 rings. If this parameter is set to 0, auto answer is switched off.

Attention

If auto answer is switched off, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC can no longer be reached via the GSM dial-up connection. If there is also no GPRS connection, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC can only be operated via the service interface.

You should set the number of rings for a ZDUE-GPRS-MUC or a ZDUE-DC-MUC to a value of < 5 rings. Many GSM networks terminate the connection if the partner does not answer after 5 or 6 rings. Make sure that you also deactivate any voice mail that may have been set up for the GSM number.

Default setting: 1 (ring)

Maximum connection duration

➲ Data structure and parameters see Chapter 21.5.

This parameter determines the maximum time for a CSD connection between the control center and the ZDUE-GPRS-MUC or the ZDUE-DC-MUC. Once this time period has expired, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC will automatically terminate the connection, regardless of whether or not data must still be exchanged between the control center and the ZDUE-GPRS-MUC or the ZDUE-DC-MUC. If a GPRS connection has been parameterized, it will be set up again automatically.

Choose from between 1 and 10000 seconds.

If this parameter is set to 0, the function is switched off. The connection will not be terminated.

Default setting: 0 (off)

Maximum idle time

➲ Data structure and parameters see Chapter 21.5.

This parameter determines the maximum idle time of a data connection between the control center and the ZDUE-GPRS-MUC or ZDUE-DC-MUC. Idle time is the time when no data is exchanged between the control center and the ZDUE-GPRS-MUC or the ZDUE-DC-MUC on the existing data connection. If the maximum idle time is reached, i.e. if no data was exchanged during the time period set, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC will terminate the connection. If a GPRS connection has been parameterized, it will be set up again automatically.

Choose from between 1 and 10000 seconds.

If this parameter is set to 0, the function is switched off. The connection will not be terminated even after longer idling period.

Default setting: 0 (off)

GSM Bearer Service Type

➲ Data structure and parameters see Chapter 21.5.

This parameter determines the operating mode of the CSD connection. The following values can be selected:

Value	Operating mode
0	Automatic negotiation of operating mode
7	9600 bps (V.32)
71	9600 bps (V.110)

Attention

Any change made to the default setting could mean that the ZDUE-GPRS-MUC or the ZDUE-DC-MUC can no longer be reached.

Default setting: 7 (9600 bps (V.32))

Current values

For GPRS-IP as well as GSM-CSD connections, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC delivers a lot of information on the GSM network it is logged into and on the SIM card used.

Attention

The ZDUE-GPRS-MUC or the ZDUE-DC-MUC updates this information internally on a regular basis. This information is requested when the GSM page is opened by the MUC configuration software and reflects the immediate status.

Signal strength

➲ Data structure and parameters see Chapter 21.8.

Here you see the field strength of the GSM network at the antenna of the ZDUE-GPRS-MUC/ZDUE-DC-MUC that the device is logged into.

This information is provided in dBm:

Value	Signal strength
> -80dBm	GSM signal good
-89 ... -80dBm	GSM signal satisfactory
-99 ... -90dBm	GSM signal weak
< -100dBm	GSM signal not satisfactory

Attention

Please observe the information provided in Chapter 4.4 on the selection and installation of the antenna.

Location Area Code

➲ Data structure and parameters, see Chapter 21.8.

This indicates the Location Area Code (LAC) of the group of GSM base stations into which the ZDUE-GPRS-MUC or the ZDUE-DC-MUC is logged. If the ZDUE-GPRS-MUC or the ZDUE-DC-MUC is not logged into the GSM network, there will be no value indicated.

Cell code

➲ Data structure and parameters, see Chapter 21.8.

This indicates the code (cell ID) of the GSM cell, into which the ZDUE-GPRS-MUC or the ZDUE-DC-MUC is logged. If the ZDUE-GPRS-MUC or the ZDUE-DC-MUC is not logged into the GSM network, there will be no value indicated.

Operator code (network)

➲ Data structure and parameters see Chapter 21.8.

This indicates the code of the network operator (MCC/MCN), into which the ZDUE-GPRS-MUC or the ZDUE-DC-MUC is logged. If the ZDUE-GPRS-MUC or the ZDUE-DC-MUC is not logged into the GSM network, there will be no value indicated.

Call number

➲ Data structure and parameters see Chapter 21.8.

This indicates the call number that is stored on the SIM card. If the call number is not stored on the SIM card, this display remains blank (blank string).

IMSI

➲ Data structure and parameters see Chapter 21.8.

This indicates the IMSI (= ***I**nternational **M**obile **S**ubscriber **I**dentifier*) stored on the SIM card. The IMSI is allocated to the subscriber contract between the SIM card user and the network operator.

ICC ID

➲ Data structure and parameters see Chapter 21.8.

This indicates the ICC-ID (= ***I**ntegrated **C**ircuit **C**ard **I**dentifier*) that is allocated to the SIM card in the ZDUE-GPRS-MUC or the ZDUE-DC-MUC, as the internationally unique article and serial number of the SIM card. This number can be uniquely identified with one SIM card.

IMEI

➲ Data structure and parameters see Chapter 21.8.

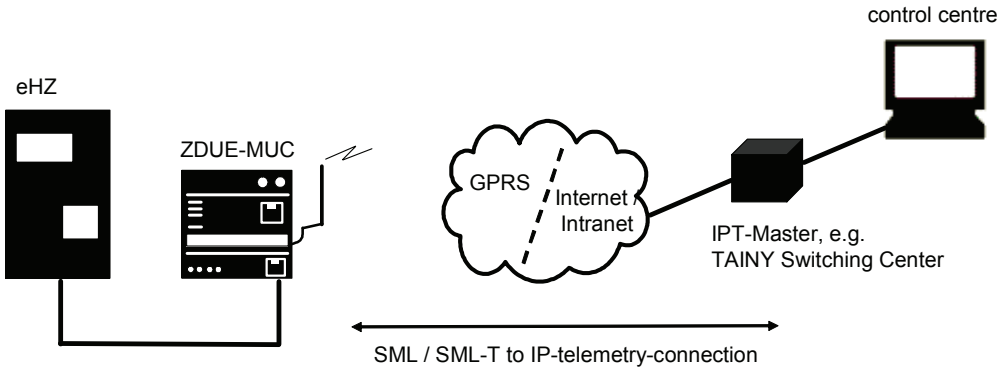
This indicates the IMEI (= International Mobile Equipment Identifier), which is allocated to this ZDUE-GPRS-MUC or ZDUE-DC-MUC as its internationally unique article and serial number. This number can be uniquely identified with its corresponding ZDUE-GPRS-MUC or ZDUE-DC-MUC.

8.3 GPRS-IP connection

The GSM wireless modem in the ZDUE-GPRS-MUC or the ZDUE-DC-MUC enables IP communication via GPRS.

For the GPRS mode, set the parameters for the GPRS connection as described in this chapter.

Please note that you will also need to set the parameters as described in Chapter 8.2 and Chapter 8.4.



When the correct configuration has been made, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC will automatically log into the GPRS service of a GSM network when it starts up or after a reboot. After that, it establishes a connection to the APN (Access Point Name) and is connected with the GPRS connection with the internet or a private intranet.

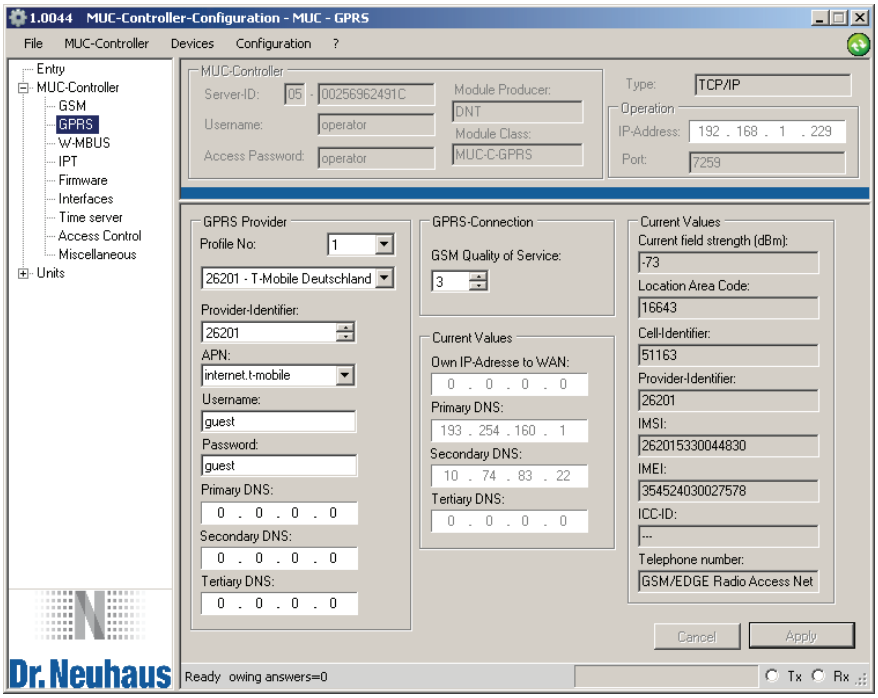
The ZDUE-GPRS-MUC or the ZDUE-DC-MUC then uses this connection to establish an IPT connection (IPT=DIN standard for IP telemetry).

The GPRS function of the ZDUE-GPRS-MUC or the ZDUE-DC-MUC will not be activated unless there is an APN entered in the parameter settings.

The prerequisite for the GPRS mode is that the ZDUE-GPRS-MUC or the ZDUE-DC-MUC has successfully logged into a GSM network. To do so, the parameters described in Chapter 8.2 must be set accordingly.

Call answering for GSM data calls (CSD) still functions while a GPRS connection is active. In this case, the GPRS connection will be interrupted for the duration of the GSM data call and then set up again afterwards.

MUC configuration software screen



GPRS providers and access data

Every GPRS provider has its own access data for the GPRS service.

Based on the network operator identifier of the SIM card inserted, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC will automatically select the corresponding profile with that access data, whereby you have to have created a profile with this access data beforehand.

Profile

You can save 10 profiles with the corresponding GPRS access data for the GSM network operators.

Each profile consists of the following parameters:

- Network provider identifier
- APN
- GPRS username
- GPRS password
- Primary DNS (optional)
- Secondary DNS (optional)
- Tertiary DNS (optional)

Provider identifier (APN)

➲ Data structure and parameters see Chapter 21.7.

Enter the parameters for the provider identifier that should be activated for this profile, e.g. 26201 for T-Mobile (also see Chapter 8.2, Provider Identifier).

If the provider identifier on the SIM card is the same as the one in the profile, the other access data from this profile will be used.

You can select from a list of pre-set providers or enter a provider and the GPRS access data manually.

APN

➲ Data structure and parameters see Chapter 21.7.

Set the parameters here for the transition from the GPRS to the internet or the intranet.

You'll find the APN (Access Point Name) in the documents provided by your GSM/GPRS provider, on their website or call their hotline to inquire.

Example: internet.t-mobile

GPRS username

➲ Data structure and parameters see Chapter 21.7.

Enter the parameters for the username for GPRS here. Some GSM/GPRS providers do not use a username and/or password to restrict access. In this case, enter *guest* in each corresponding input box.

GPRS password

➲ Data structure and parameters see Chapter 21.7.

Set the parameters for the password for GPRS here. Some GSM/GPRS providers do not use a username and/or password to restrict access. In this case, enter *guest* in each corresponding input box.

Primary DNS, Secondary DNS, Tertiary DNS

➲ Data structure and parameters see Chapter 21.7.

Enter the parameters of the IP address of the primary DNS (= *Domain Name Server*), the secondary DNS and the tertiary DNS here.

You'll find the IP addresses of the DNS in the documents provided by your GSM/GPRS provider, on their website or call their hotline to inquire.

If no parameters have been set for the primary DNS, the ZDUE-GPRS-MUC or the ZDUE-DC-MUC will use the IP addresses allocated by the GPRS service.

The DNS are needed when the NTP server is addressed by a host name and not by an IP address (See Chapter 9).

Default setting:

Profile	Provider identifier	APN	Username	User password	1st, 2nd, 3rd DNS
1	26201 (T-Mobile)	internet.t-mobile	guest	guest	None
2	26202 (Vodafone)	web.vodafone.de	guest	guest	None
3	26203 (e-plus)	internet.eplus.de	eplus	gprs	None
4	26207 (O2)	internet	guest	guest	None
5-10	No default settings				

None = No DNS entered; DNS is pulled automatically.

Establishing connection

GPRS - Quality of Service

➲ Data structure and parameter, see Chapter 21.5

The Quality of Service parameter defines the behavior for establishing connection to the IPT master after a reboot or an interruption. The Quality of Service parameter also determines whether or not a quick reconnection is desired. A quick reconnection usually requires repeated attempts and leads to increased data volumes. This can result in high costs.

Fewer attempts at reconnection reduce the data volumes and the resulting costs, but this delays the reconnection.

The reconnection is performed in three steps:

- Step 1: Log into the GSM network
- Step 2: Connection to the APN of the GPRS
- Step 3: Connection to the IPT master

The system will not proceed with the next step until the previous step has

been successfully completed.

Value	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
GSM_RECONNECT_DELAY	0	1	2	5	8	10	12	20	30	60
GSM_CONNECT_ATTEMPTS	1	5	3	3	3	2	1	1	1	1
GPRS_RECONNECT_DELAY	0	1	2	5	8	10	12	20	30	60
GPRS_CONNECT_ATTEMPTS	1	5	3	3	3	2	1	1	1	1
IPT_RECONNECT_DELAY	0	1	2	5	8	10	12	20	30	60
IPT_CONNECT_ATTEMPTS	1	5	3	3	3	2	1	1	1	1

The delay for GSM_RECONNECT_DELAY, GPRS_RECONNECT_DELAY and IPT_RECONNECT_DELAY is indicated in minutes.

The values indicated in the table above affect the following process diagrams.

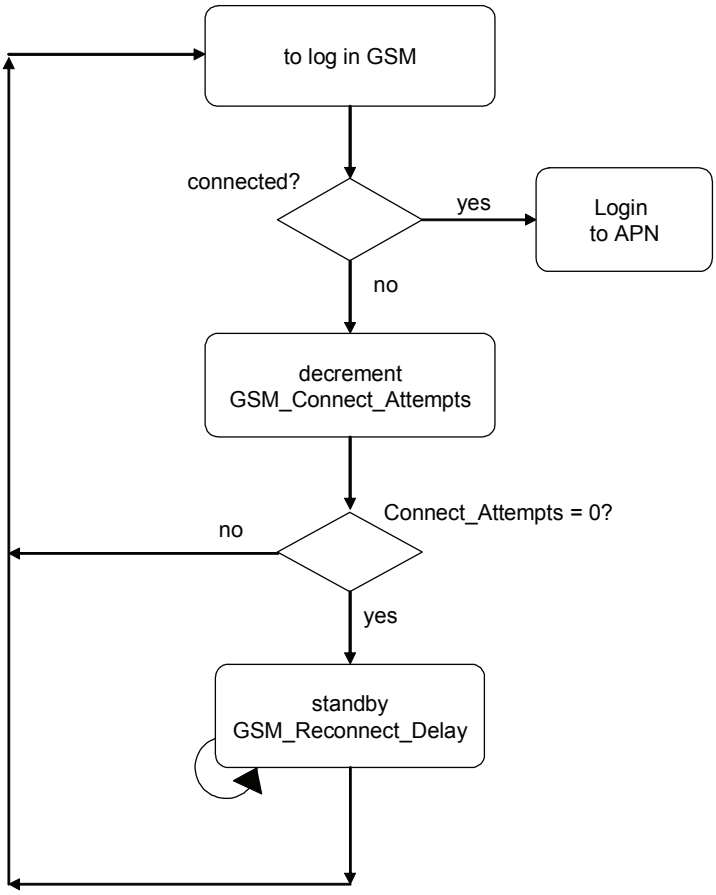
If the Quality of Service parameter is set to zero, a reconnection is performed using the following parameters:

- IPT connection – number of repeats or
- IPT connection – waiting time,

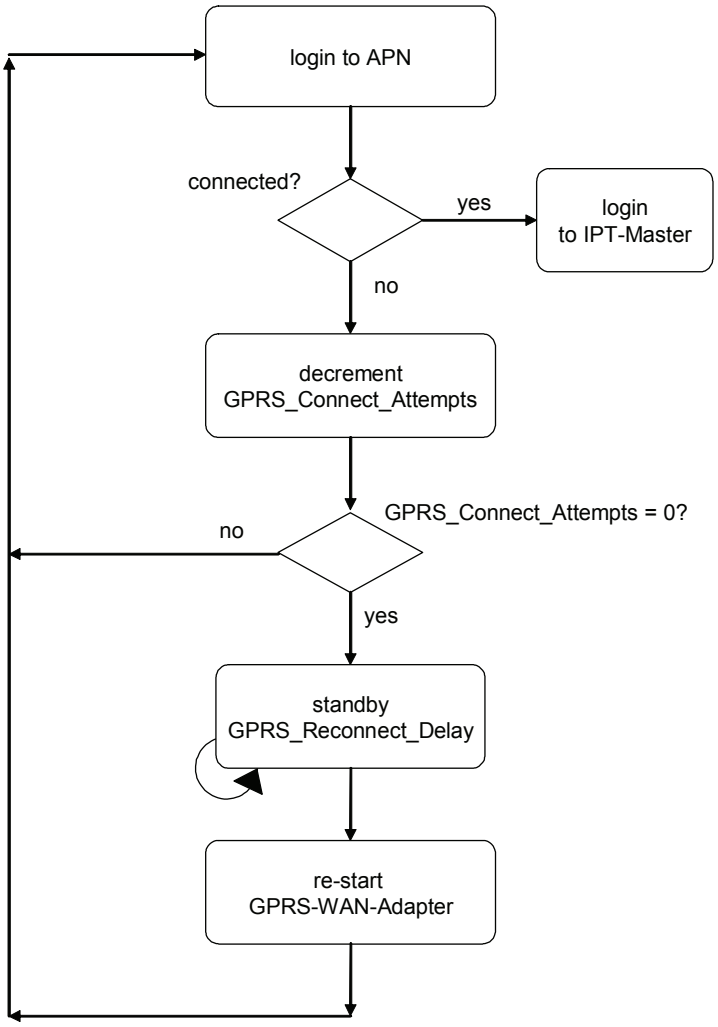
See Chapter 8.4.

Default setting: 3

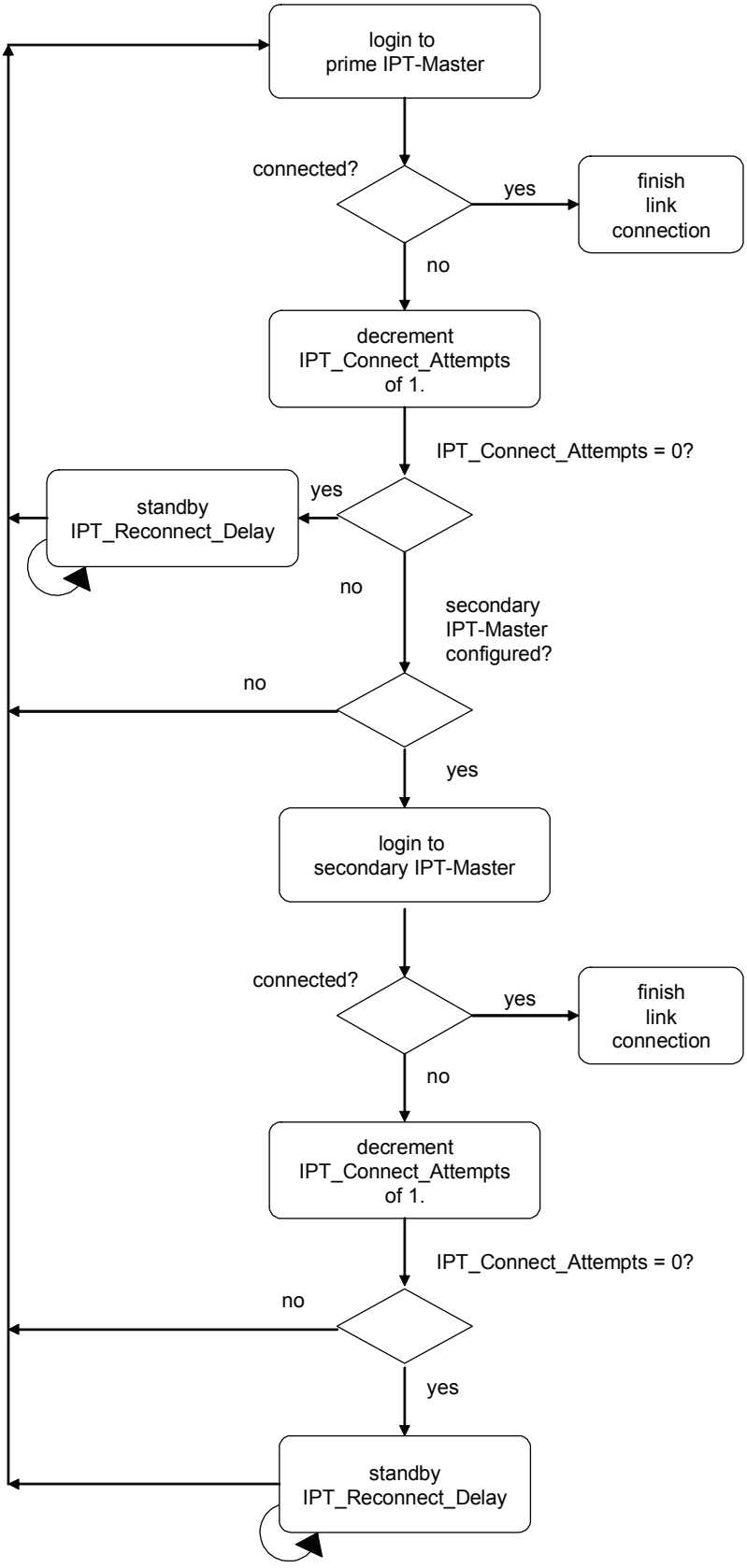
Step 1: Log into the GSM network



Step 2: Connection to the APN of the GPRS



Step 3: Connection to IPT master



Current values

Current DNS

➲ Data structure and parameters see Chapter 21.8.

The display shows the IP addresses of the DNS used. They can be the ones set in the profile or the ones allocated by the GPRS service.

Own IP to the WAN

➲ Data structure and parameters see Chapter 21.8.

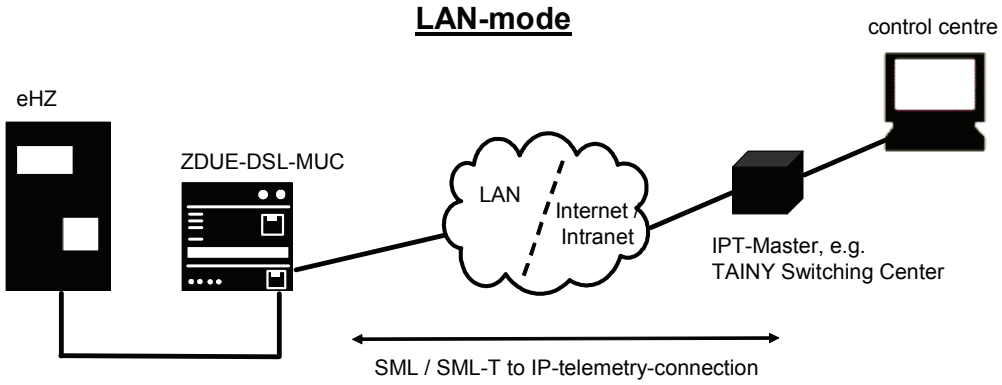
The own IP address to the WAN is pulled automatically for GPRS connections to the GPRS. The GPRS allocates either a dynamic IP address or, if arranged with the network operator, a fixed IP address.

8.4 LAN or DSL connection

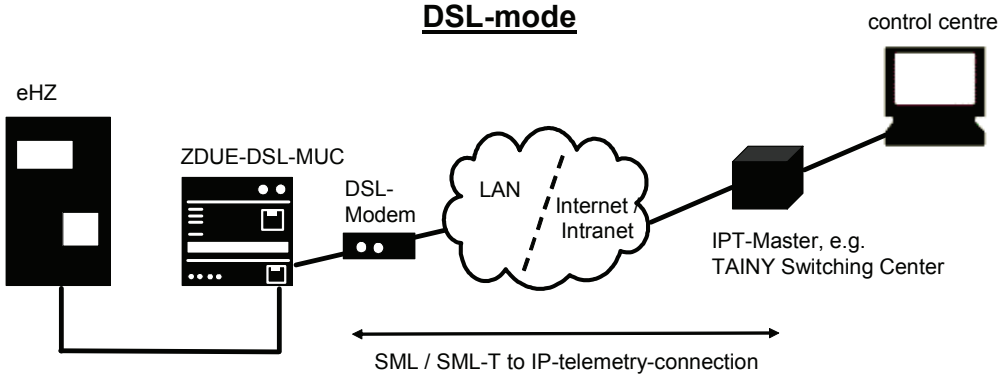
The ZDUE-DSL-MUC is equipped with a LAN interface, which enables either the direct connection to an Ethernet LAN or to a DSL modem.

Follow the directions in this chapter to set the parameters of the control center connection of the ZDUE-DSL-MUC. Please note that you must also set the parameters as described in Chapter 8.5.

A number of other parameters that provide information on the status of the connection are also explained.



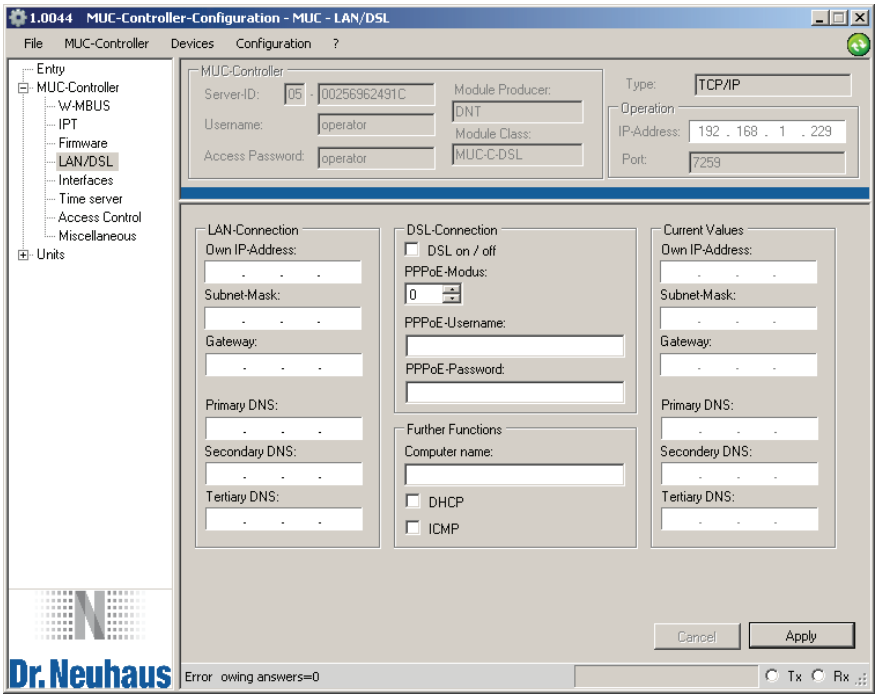
In LAN mode, the ZDUE-DSL-MUC is connected directly with an IP router and, if configured to do so, automatically logs into the LAN when switched on or after a reboot so that it is connected to the internet or a private intranet.



In DSL mode, the ZDUE-DSL-MUC is connected with a DSL modem with an Ethernet interface and, if configured to do so, automatically logs into the LAN when switched on or after a reboot so that it is connected to the internet or a private intranet.

Using these connections in LAN and in DSL mode, the ZDUE-DSL-MUC then sets up an IPT connection (IPT=DIN standard for IP telemetry).

MUC configuration software screen



DSL connection

DSL mode

➲ Data structure and parameters, see Chapter 21.9

Click the box to set a checkmark if the ZDUE-DSL-MUC is connected to a DSL modem (DSL mode). Then the ZDUE-DSL-MUC will start the PPPoE protocol for communication with the DSL modem.

Do not click the box to set a checkmark if the ZDUE-DSL-MUC is connected to an IP router (LAN mode).

Default setting: False (= LAN mode)

PPPoE mode

➲ Data structure and parameters see Chapter 21.9.

Reserved

PPPoE username

➲ Data structure and parameters see Chapter 21.9.

The PPPoE mode parameter applies to the DSL mode only.

Parameterize the username to set up the DSL connection. It contains the username for the provider of your DSL connection or your internet service provider.

Default setting: guest

PPPoE password

➲ Data structure and parameters see Chapter 21.9.

The PPPoE mode parameter applies to the DSL mode only.

Parameterize the password to set up the DSL connection. It contains the password for the provider of your DSL connection or your internet service provider.

Default setting: guest

LAN connection

Own IP address

➲ Data structure and parameters see Chapter 21.9.

Parameterize the IP address under which the ZDUE-DSL-MUC can be reached.

For DSL mode or when using DHCP, the system's own IP address is automatically allocated via LAN or DSL. In this case, do not enter any values.

Attention

Entries have priority over allocated values.

Default setting: 0.0.0.0

Own subnet mask

➲ Data structure and parameters see Chapter 21.9.

Set the parameters for the ZDUE-DSL-MUC subnet mask to the LAN or to the DSL modem here.

For LAN mode or when using DHCP, the system's own subnet mask is automatically allocated via LAN. In this case, do not enter any values.

Attention

Entries have priority over allocated values.

Default setting: 255.255.255.0

Own gateway IP

➲ Data structure and parameters see Chapter 21.9.

Set the parameters for the ZDUE-DSL-MUC gateway IP to the LAN or to the DSL modem here.

For LAN mode or when using DHCP, the system's own gateway IP is automatically allocated via LAN. In this case, do not enter any values.

Attention

Entries have priority over allocated values.

Default setting: 0.0.0.0

Primary DNS, secondary DNS, tertiary DNS

➲ Data structure and parameters see Chapter 21.9.

Set the parameters here for the IP address of the primary DNS (= *Domain Name Server*), the secondary DNS and the tertiary DNS.

The DNS IP addresses do not have to be parameterized if the ZDUE-DSL-MUC is allocated these addresses by a DHCP server in the LAN. In this case, do not enter any values.

Attention

Entries have priority over allocated values.

The DNS are needed when the NTP servers are addressed via a host name and not via an IP address (See Chapter 21.9.)

Default setting: 0.0.0.0 (primary, secondary, tertiary DNS)

Other functions

Computer name

➲ Data structure and parameters see Chapter 21.9.

Set the parameters for a computer name for the ZDUE-DSL-MUC here, e.g. you can use the server ID as the computer name.

Default setting: SERVER ID of the MUC controller

DHCP

➲ Data structure and parameters see Chapter 21.9.

This parameter only has an effect when the DSL mode is switched off.

Place a checkmark in the box if you are using a DHCP server and the ZDUE-DSL-MUC gets its own IP address, the subnet mask, the DNS addresses automatically from a DHCP server in the LAN.

Default setting: True (DHCP on)

ICMP

➲ Data structure and parameters see Chapter 21.9.

Set this parameter to determine how the ZDUE-DSL-MUC is to react to ICMP ping packets that it receives via the LAN or DSL connection.

If you set a checkmark, the ZDUE-DSL-MUC will respond to the ICMP ping packets.

If you do not set the checkmark, the ICMP ping packets will not be responded to. They will be rejected.

Default setting: False (= no ICMP)

Attention

Activating the ICMP function can involve the risk of increased communication costs and a blocking of the control center connection because there is a response to every ping packet received.

Current values

The screen displays the currently used values for the following parameters:

➲ Data structure and parameters see Chapter 21.10**.**

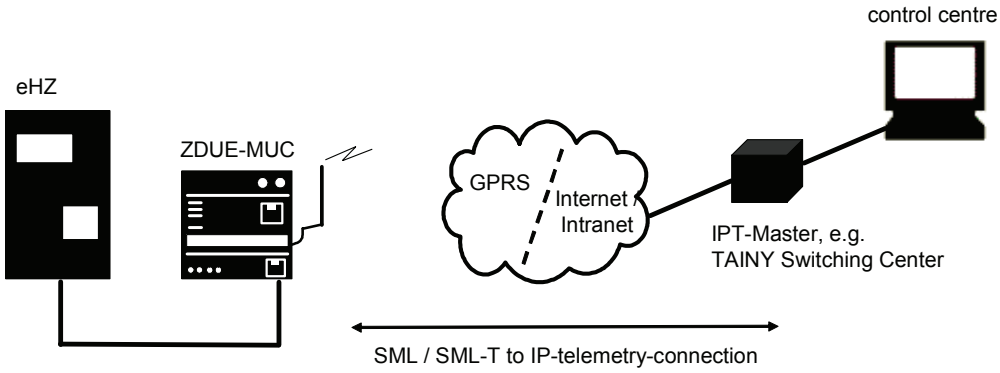
- Own IP address
- Own subnet mask
- Own gateway IP
- Primary DNS, secondary DNS, tertiary DNS

8.5 IP telemetry connection

The ZDUE-GPRS-MUC and the ZDUE-DC-MUC in the GPRS mode use the IP telemetry protocol (IPT) for the connection to the remote control center. As does the ZDUE-DSL-MUC.

To set the parameters for the IP telemetry connection, follow the directions provided in this chapter.

A number of other parameters that provide information on the status of the connection are also explained.

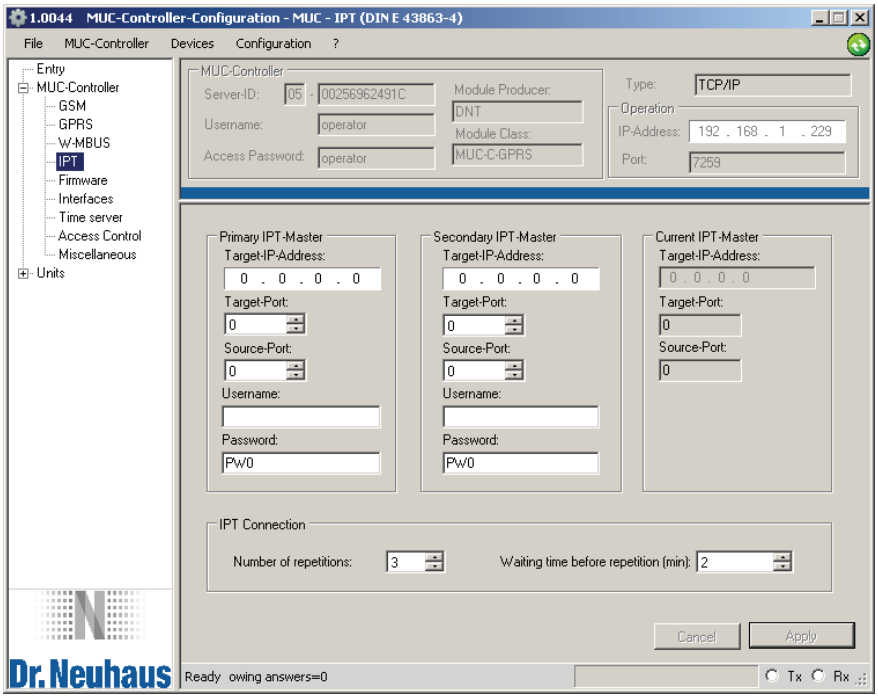


As soon as the connection to the internet or intranet is set up via GPRS, the ZDUE-MUC (except for the ZDUE-PLC-MUC) will set up an IP telemetry connection according to E DIN 43863-4 to the parameterized IP telemetry master. To do so, there must be an access for the device on the IP telemetry master (e.g. Tainy Switching Center 3). The login requires a password and username.

The login can be denied by the IP telemetry master if the IP telemetry master is already busy. In this case, the ZDUE-MUC can log into a secondary IPT master.

The control center is also connected to the IP telemetry master. The communication between the ZDUE-MUC and the control center then takes place via the IPT master.

MUC configuration software screen



Primary and secondary IPT master

Target IP address

➲ Data structure and parameters see Chapter 21.11.

Set the parameter for the public IP address under which the primary or the secondary IPT master can be reached.

Default setting: Primary: 0.0.0.0; Secondary: 0.0.0.0

Target port

➲ Data structure and parameters see Chapter 21.11.

Set the parameter for the port number under which the primary or secondary IPT master can be reached.

Default setting: Primary: 0; Secondary: 0

Source port

➲ Data structure and parameters see Chapter 21.11.

Set the parameter for the number of the IP port on the ZDUE-MUC, from which the IP telemetry connection is set up to the primary IPT master.

If this value is set to 0, the ZDUE-MUC will freely select the source port for each new connection.

Default setting: Primary: 0; Secondary: 0

Username

➲ Data structure and parameters see Chapter 21.11.

Set the parameter for the username for authentication at the primary or secondary IPT master.

Default setting: Primary, Secondary: Server ID

Password

➲ Data structure and parameters see Chapter 21.11.

Set the parameter for the password for authentication at the primary or secondary IPT master.

Default setting: Primary, Secondary: NONE (=no entry)

IPT connection

Number of repetitions

➲ Data structure and parameters, see Chapter 21.11

Here set the parameter for the number of repetitions to be made to reconnect an interrupted IPT connection.

This parameter is only used if the Quality of Service parameter (See Chapter 8.3) is set to 0. Otherwise, it won't appear on the MUC configuration software screen.

Default setting: 3

Waiting time before repetition

➲ Data structure and parameters, see Chapter 21.11

Set the parameter for the waiting time between attempts to reconnect an interrupted IPT connection.

This parameter is only used if the Quality of Service parameter (See Chapter 8.3) is set to 0. Otherwise, it won't appear on the MUC configuration software screen.

Default setting: 120 seconds

Current IPT master

The display shows the following parameters for the IPT master currently in use:

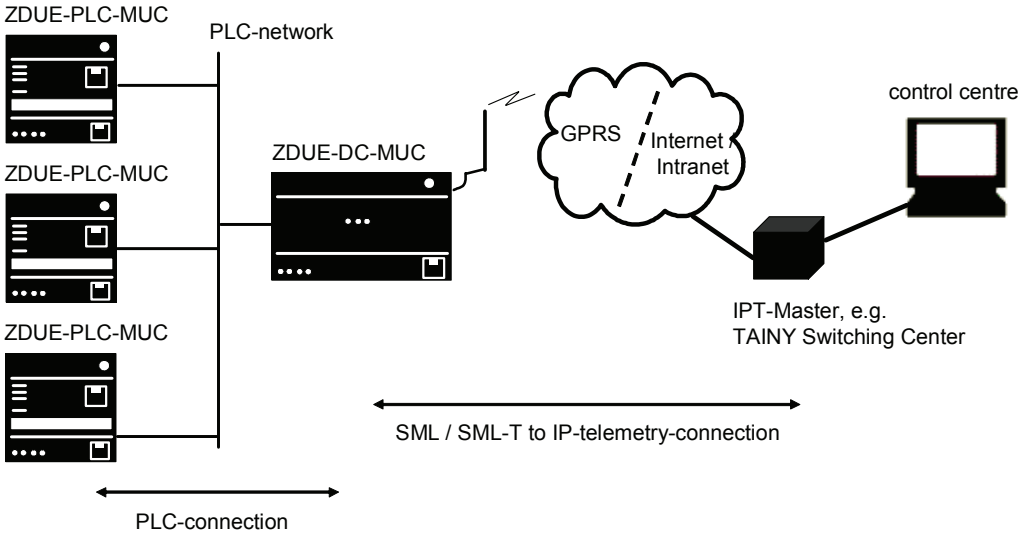
➲ Data structure and parameters see Chapter 21.11.

- Current target IP address
- Current target port
- Current source port

8.6 Power Line Communication (PLC)

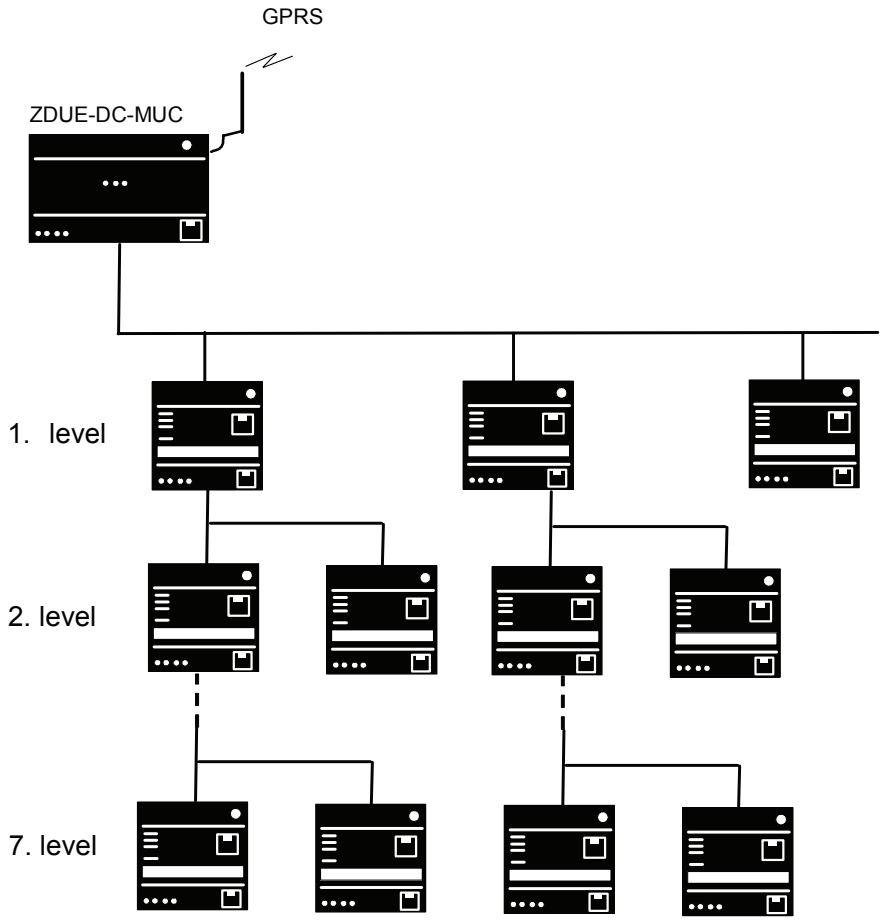
How it works

To communicate with its control center, the ZDUE-PLC-MUC uses a method of data transmission via power lines (Power Line Communication - PLC). The end point of the PLC data transmission from/to the ZDUE-PLC-MUC is the ZDUE-DC-MUC. The ZDUE-DC-MUC is a data concentrator, which bundles the PLC data transmission of the ZDUE-PLC-MUC in its service area and forwards it via the GPRS/IPT connection to the control center.



The maximum data transmission rate is 2500 bps half-duplex to the PLC interface of the ZDUE-DC-MUC. The ZDUE-DC-MUC has to use this PLC interface to serve all the ZDUE-PLC-MUCs connected. As a result, the PLC interface at the ZDUE-DC-MUC is only available for a limited period of time. In addition, the data transmission rate is reduced by repetitions due to transmission over several levels as well as by interference signals in the power line.

The connection set-up between a ZDUE-PLC-MUC and the ZDUE-DC-MUC is initiated by the ZDUE-PLC-MUC after a reboot. It tries to re-establish the connection to the ZDUE-DC-MUC it communicated with last before the reboot. If the attempts to connect fail repeatedly or if there was no connection to a ZDUE-DC-MUC before the reboot, the ZDUE-PLC-MUC will search for any other available ZDUE-DC-MUC.

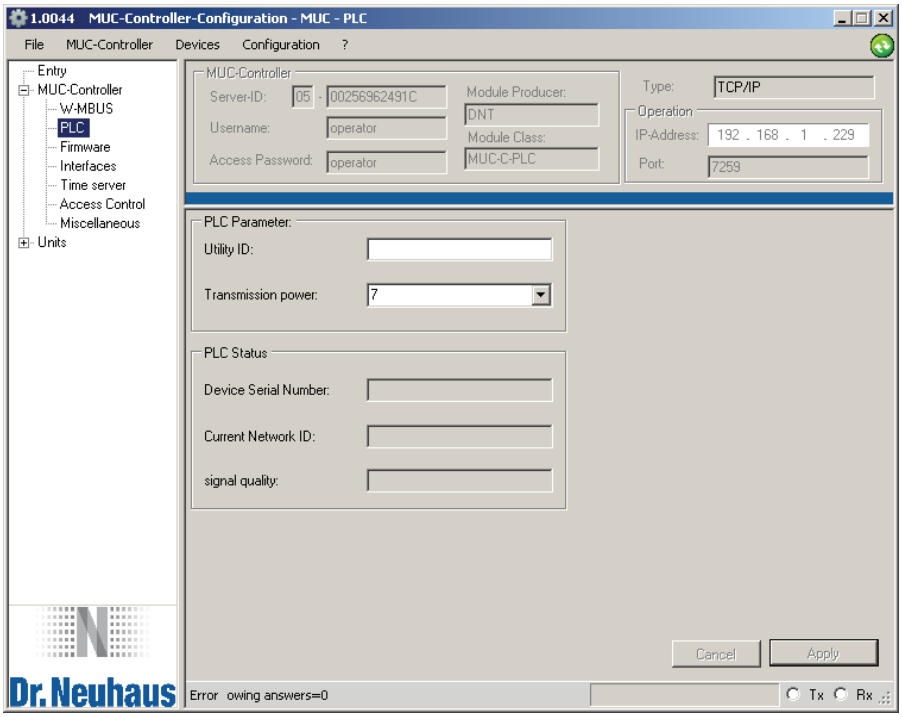


If a ZDUE-PLC-MUC cannot directly contact the ZDUE-DC-MUC, an attempt will be made to connect via other ZDUE-PLC-MUCs, which have either a direct connection to the ZDUE-DC-MUC themselves or are already also connected with the ZDUE-DC-MUC via other ZDUE-PLC-MUCs. The PLC network used allows up to seven levels. When a message is transported over more than one level, it is received by a ZDUE-PLC-MUC on each level and then repeated. This process is time-consuming and reduces the bandwidth on the PLC network. That is why it is advisable to avoid more than 4 to a max. of 5 levels in any one PLC network by intelligently distributing ZDUE-DC-MUCs and ZDUE-PLC-MUCs.

Because of the restricted transmission speed to the PLC connection, it is necessary to limit the direct access of the control center to a ZDUE-PLC-MUC to the parameterization. To give the control center quick access to usage data, every ZDUE-PLC-MUC periodically transmits the meter data received to the ZDUE-DC-MUC. The ZDUE-DC-MUC then transmits the data to the control centers on request or automatically.

PLC parameters

PLC devices generally come from the factory already set up to establish PLC communication automatically. Settings only need to be made in exceptional cases.



Utility ID

Identification number of the PLC network operator. Do not alter this setting unless instructed to do so by our customer service.

Transmission power

Transmission power of the PLC modem from 1 ….7, whereby 7 stands for the highest and 1 for the lowest transmission power. Do not alter this setting unless instructed to do so by our customer service.

PLC status

Device serial number

Identification number of the PLC modem in the PLC network.

Current network ID

Identification number of the PLC network.

Signal quality

Indicates the quality with which the PLC signal is received by the ZDUE-PLC-MUC or the ZDUE-DC-MUC. The value lies between 1 ….7, whereby 7 stands for the highest and 1 for the lowest signal quality.

Synchronization between the ZDUE-PLC-MUC ⇔ the ZDUE-DC-MUC

General information

The synchronization of the parameterization between the ZDUE-PLC-MUC and the ZDUE-DC-MUC does not require manual configuration. The parameters for the data mirror, the data collector and the push function are always set in the ZDUE-PLC-MUC and then transmitted to the ZDUE-DC-MUC.

The commands for synchronization do not run simultaneously, but rather one after the other and, depending on the direction, have a timeout of 1 to 4 hours. If a command should fail, the procedure is repeated.

After a reboot

The ZDUE-PLC-MUC logs into the ZDUE-DC-MUC and then transmits activation commands for all its activated data mirrors, data collectors and push processes to the ZDUE-DC-MUC.

If the activation takes place on the ZDUE-DC-MUC, the local configuration of the ZDUE-PLC-MUC is compared with the configuration on the ZDUE-DC-MUC on the basis of hash values.

If the configuration on the ZDUE-DC-MUC deviates, the ZDUE-PLC-MUC transmits the configuration of the data mirror, data collector and push processes to the ZDUE-DC-MUC.

Weekly

If the configuration is transmitted for the first time after a reboot, the configuration of the ZDUE-DC-MUC is compared with the configuration of the local ZDUE-PLC-MUC once a day and synchronized if there are any deviations.

Changes

Any changes made to the configuration on the ZDUE-PLC-MUC are transmitted immediately to the ZDUE-DC-MUC. Should there be other processes in progress, however, there may be delays.

List of visible devices

In the event of any changes or every 12 hours at the latest, the ZDUE-PLC-MUC transmits its list of visible devices to the ZDUE-DC-MUC. The ZDUE-DC-MUC adds the visible devices reported by the ZDUE-PLC-MUC to its list.

Synchronization of the time

When the ZDUE-PLC-MUC logs into the ZDUE-DC-MUC, the ZDUE-DC-MUC sets the time in the ZDUE-PLC-MUC. After that, the time is set again once a day.

Synchronization of the usage data collected

Based on the parameters set for the data mirror, the ZDUE-DC-MUC requests data periodically from the data mirror of the ZDUE-PLC-MUC and transmits any new datasets received since the last request.

The requests for data are made in the following intervals:

- Annual data => once a day
- Monthly data => once a day
- Weekly data => once a day
- Daily data => every 12 hours
- Hourly data => every hour[2]

If a push process has been set for shorter intervals, this information is read directly out of the ZDUE-PLC-MUC via PLC. A data collector is not set up for this in the ZDUE-DC-MUC.

[2] The hourly data is not synchronized unless a push process has been activated for this hourly data on the ZDUE-PLC-MUC.

9 Time Server

The ZDUE-GPRS-MUC, the ZDUE-PLC-MUC and the ZDUE-DC-MUC are all equipped with a time server, which can be queried using a SML command. The current UTC is made available.

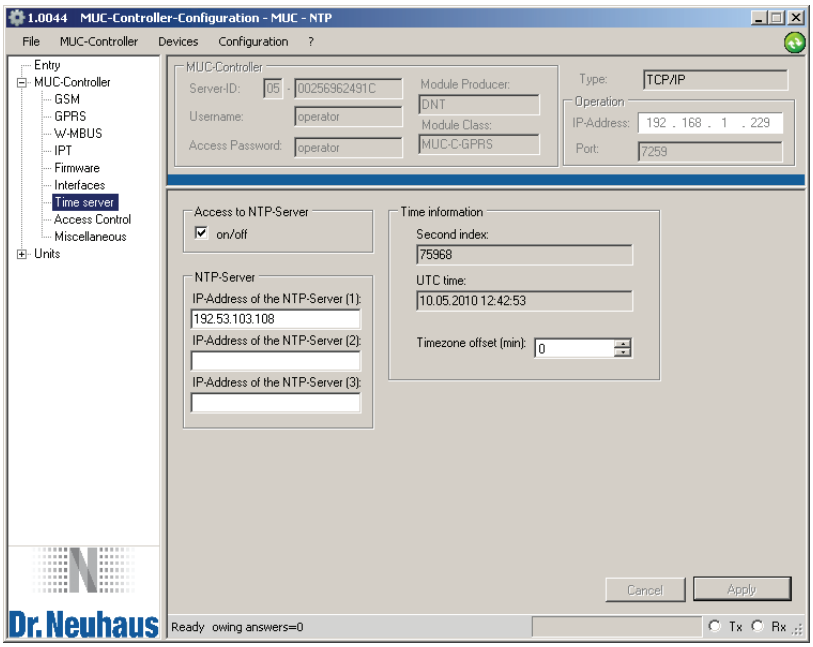
The ZDUE-GPRS-MUC and the ZDUE-DC-MUC can synchronize the time server via GPRS with an external NTP server (NTP = Network Time Protocol) on the internet or intranet. The ZDUE-PLC-MUC receives the time information from the ZDUE-DC-MUC via the PLC connection.

The ZDUE-GPRS-MUC and the ZDUE-PLC-MUC use the time information to mark the datasets coming from the meters with an exact time stamp.

If there is no time synchronization with an NTP server or with a ZDUE-DC-MUC, the ZDUE-MUC uses its internal real-time clock as the basis for the time for a maximum of 48 hours. After that, the ZDUE-MUC does not provide any more time information until it has once again been synchronized via the PLC or the NTP.

Parameterization of the NTP connection

MUC configuration software screen



IP address of the NTP server (1-3)

➲ Data structure and parameters see Chapter 21.27.

Set the parameters for the IP addresses or host names of up to 3 NTP servers. The system will first attempt to retrieve the time from the first NTP server; should this fail, it will try the next NTP server.

According to the internet standards, port 123 is always used for NTP.

Default setting: blank (= no entries)

Access to the NTP server (On/Off)

➲ Data structure and parameters see Chapter 21.27.

Switch the time synchronization with the NTP servers on or off.

Default setting: Off

Time information

Seconds index

➲ Data structure and parameters see Chapter 21.2 and 21.26.

The seconds index records the operating time of the ZDUE-MUC in seconds. The seconds index starts after the initialization of the ZDUE-MUC following a reboot and stops with a reboot or after a disconnection from the power supply.

During operation, the meter reading of the seconds index is saved every 15 minutes at the latest in a non-volatile memory. See Chapter 13.1.

UTC time

➲ Data structure and parameters see Chapter 21.2 and 21.26.

This indicates the UTC time of the ZDUE-MUC. The time is kept on a real-time clock in the ZDUE-MUC. The UTC time can be set manually, see Chapter 18.2.

Insofar as there is a connection to an NTP server, the real-time clock will be set on a regular basis via NTP in the ZDUE-GPRS-MUC and in the ZDUE-DC-MUC. For the ZDUE-MUC-PLC, the real-time clock is set using a PLC connection function. Any manual time setting made will be reset automatically.

Offset to the actual time zone in minutes

➲ Data structure and parameters see Chapter 21.2 and 21.26.

Enter the offset between UTC and the actual time zone. As for the UTC time, this offset can be queries by the devices connected themselves.

10 Access Control

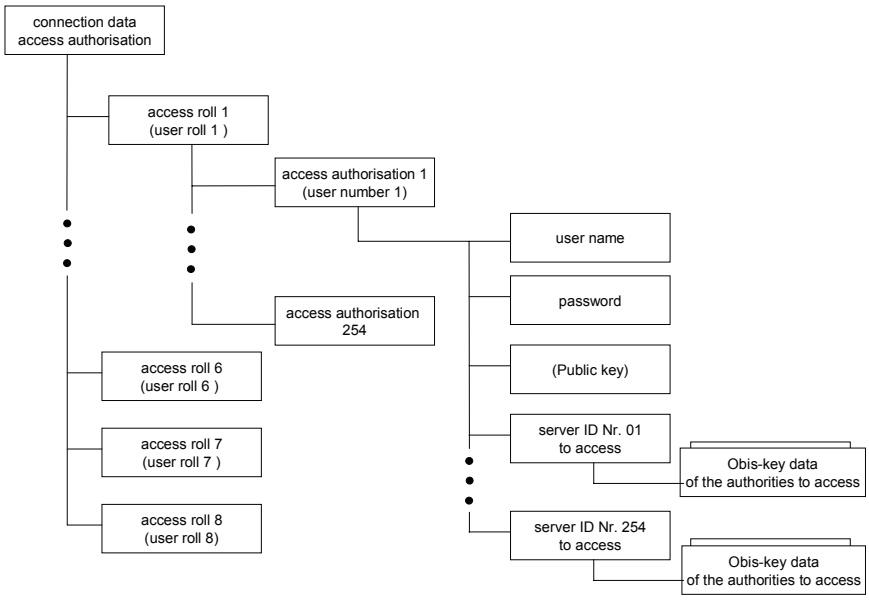
The ZDUE-MUC allows access to data and parameters only when a valid username and a valid password are entered.

Different access rights can be created and allocated to each username and password as required.

Access rights

The access rights are sorted according to access roles. There are eight different access roles:

- Guest
- End user
- MUC operator
- Device operator
- Metering service provider
- Supplier
- Manufacturer
- Reserved



Up to 254 different access rights (users) can be allocated to each access role with their own username and password. A public key can also be allocated for later applications.

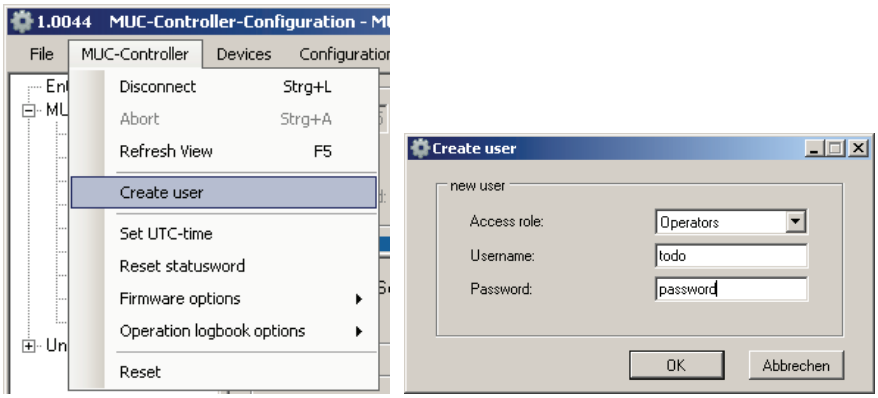
Each access right can allow access to data structures and individual parameters of the ZDUE-MUC. Write, read and execute rights can be allocated separately.

Create user

➲ Data structure and parameters, see Chapter 21.33

To create a new user, go to *Create user* in the *MUC Controller* menu.

Attention: You will require the corresponding access rights in order to be able to create a new user.



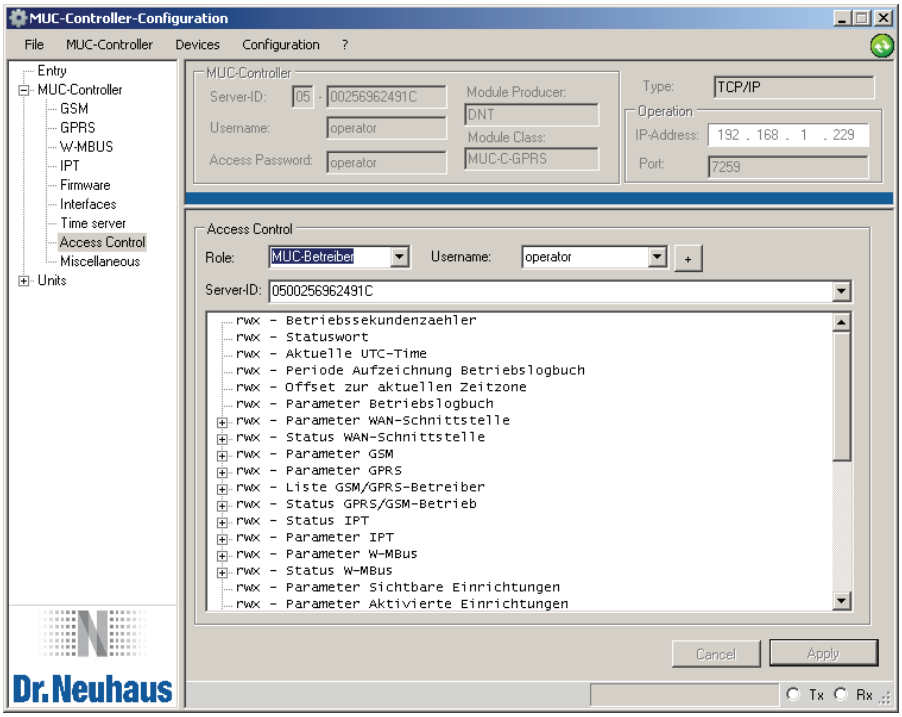
Access role

Select the *Access role* for the new user. A number of standard access rights are already defined for each user role in the ZDUE-MUC. These rights can be edited separately for each user in the Access control screen.

Username, password

Enter the username and password to be used to access the ZDUE-MUC.

Edit access rights



Role, username

Click on *Role* and *Username* to select the user for whom you want to edit the access rights.

Server ID

Click on *Server ID* to select the device (MUC controller, meter etc.) for which you want to edit the access rights.

The table with the access rights indicates the instance and the existing access rights:

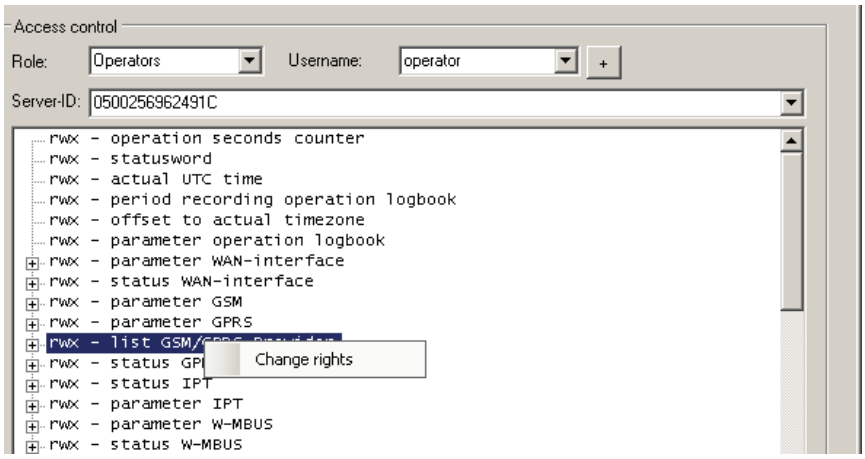
r = reading access

w = writing access

x = execution

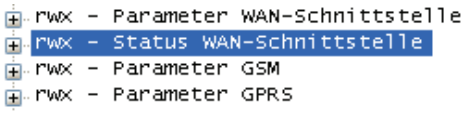
Reading access allows the user to read the data access; writing access allows the user to read and edit the data. The execute right is not currently supported by the ZDUE-MUC.

Mark the table entry you want to edit.

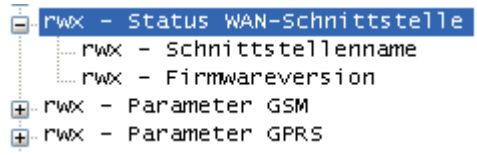


The root elements of the parameters are marked with a “+” in the table. One root element comprises several parameters (cf. Chapter 20). Click on the “+” to see the individual parameters.

Drop-down box closed:

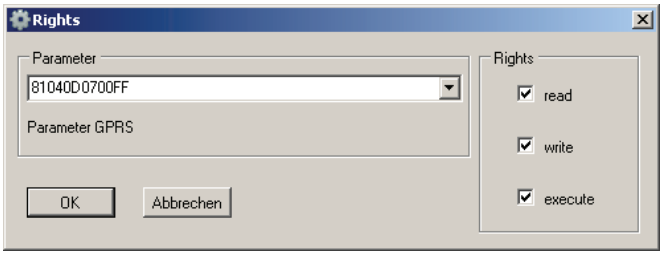


Drop-down box open:



Click the right mouse button to open the edit menu for the access rights.

If you edit an element marked with a “+”, these settings will apply for all the other parameters for this element.



Select the parameter for which you want to edit the access rights and then click *OK*.

Standard activation of the data mirror

The following rights are required for the configuration of a data collector, its data mirror and the push processes:

General:

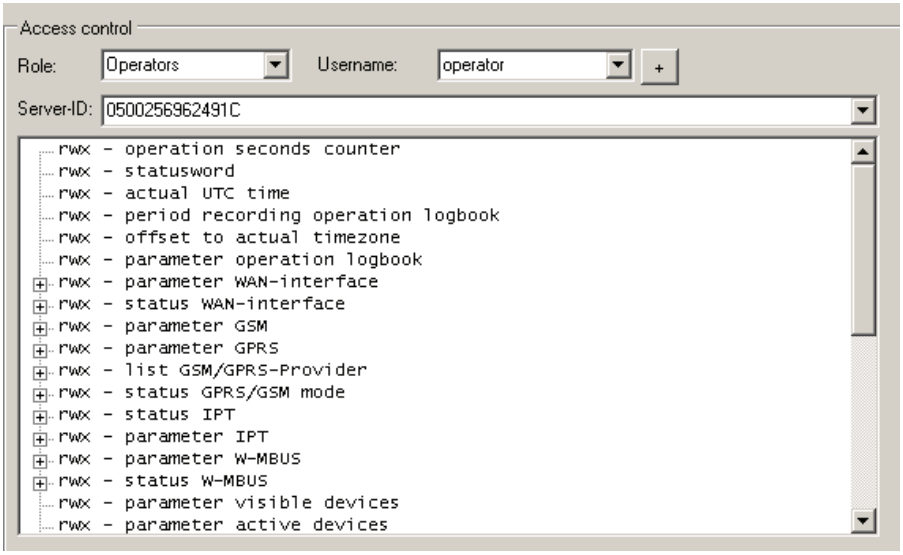
8181C78A01FF	Push root element
8181C78600FF	Data mirror root element
8181C78620FF	Data collector root element
990000000003	Current dataset

And for the data collector created:

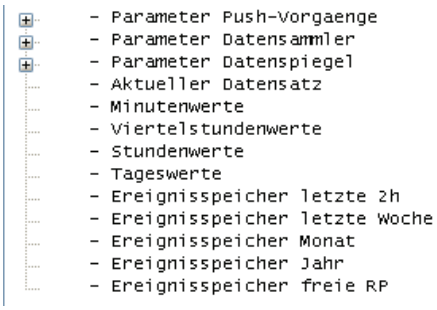
8181C78610FF	Minute values
8181C78611FF	Quarter hour values
8181C78612FF	Hourly values
8181C78613FF	Daily values
8181C78615FF	Weekly values
8181C78616FF	Monthly values
8181C78617FF	Annual values
8181C78618NN	Open registration period NN = 01 .. 0A

These parameters do not have to be activated manually:

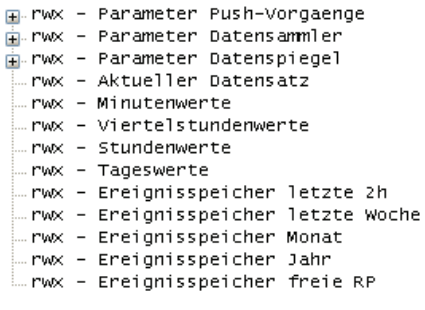
Select the server ID of the meter or the corresponding data mirror. A screen for the *Standard activation* to set the standard rights for access to this data mirror and the data stored there will appear.



Prior to the standard activation:



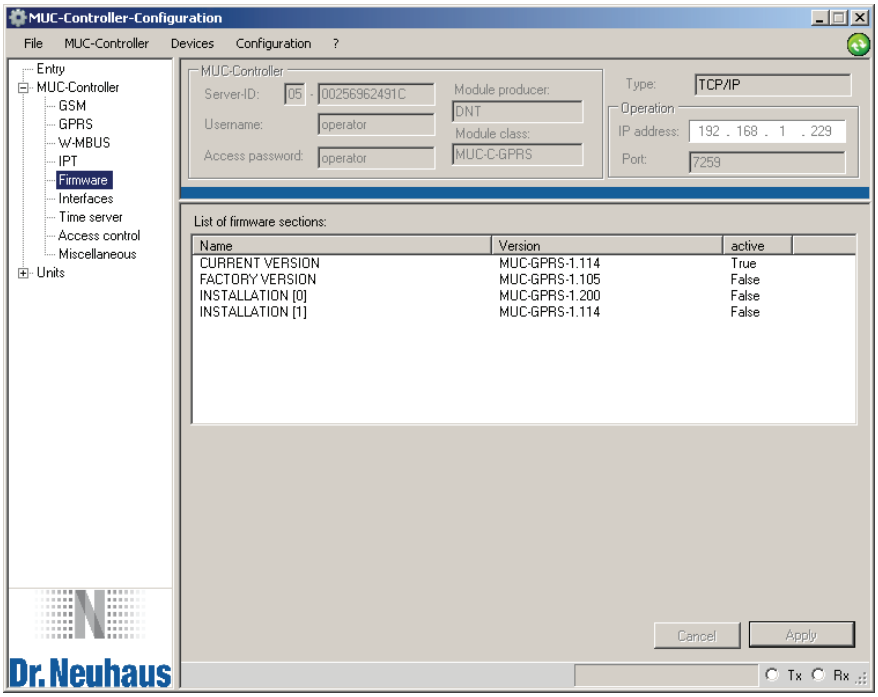
Following the standard activation:



After this, access to these parameters will be activated for the user selected.

11 Firmware

The firmware contains the basic programming of the ZDUE-MUC and consists of several components.



List of the firmware sections

Name

➲ Data structure and parameters, see Chapter 21.1

The screen will show a list of the firmware components in the ZDUE-MUC.

“CURRENT VERSION” is the firmware currently active.

“FACTORY VERSION” is the firmware loaded during the production process.

“INSTALLATION [0]” is the firmware last loaded”.

“INSTALLATION [1]” is the firmware loaded next to last.

Version

➲ Data structure and parameters, see Chapter 21.1

The screen indicates the version numbers of the firmware components in the ZDUE-MUC.

Activated

➲ Data structure and parameters, see Chapter 21.1

The screen shows which firmware is currently activated (true) and which is not (false).

Firmware update

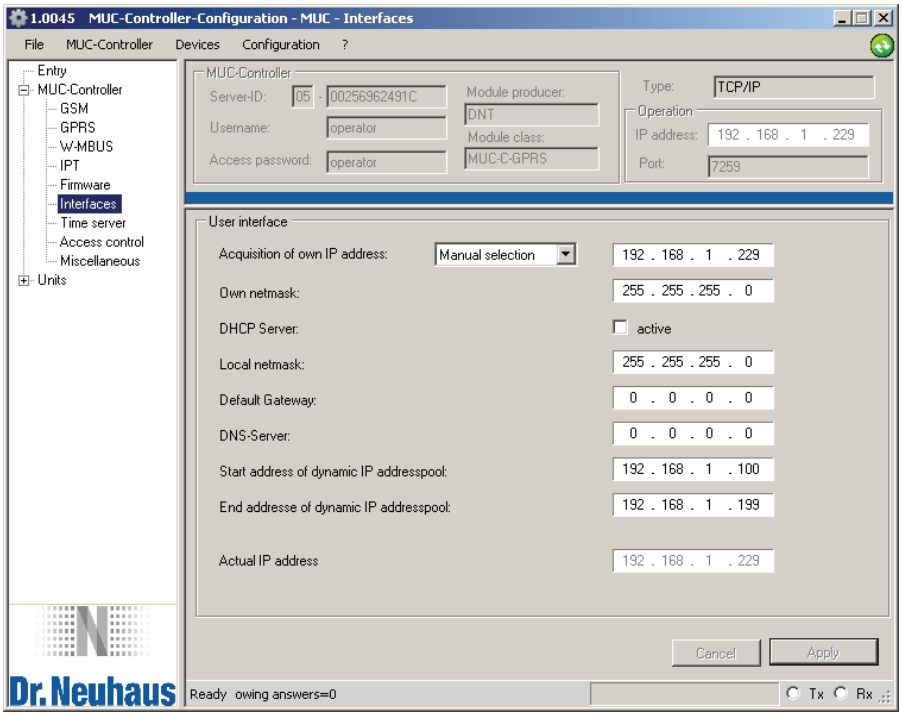
The ZDUE-MUC firmware can be updated.

See Chapter 18.4

12 Customer and Service Interface I3

Interface I3 (customer and service interface) is used to connect an end-user device, such as a PC with visualization software to show the current usage data or to connect a device to configure the ZDUE-MUC.

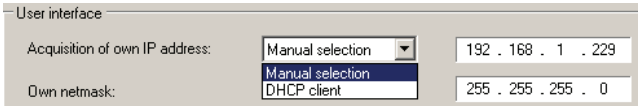
Interface I3 is an Ethernet interface that uses TCP/IP protocol. The attributes of Interface I3 can be parameterized.



IP address and network mask

➲ Data structure and parameters, see Chapter 21.34.

Acquisition of own IP address



The ZDUE-MUC can operate on Interface I3 either with a fixed IP address or get the IP address of the interface via the DHCP client from a DHCP server connected with the interface.

If the ZDUE-MUC is to operate with a fixed IP address, select Manual selection. Then enter the desired IP address for the ZDUE-MUC in the textbox beside it.

If the ZDUE-MUC is to automatically get its IP address via DHCP, select DHCP client. If you enter an IP address into the textbox beside it, the ZDUE-MUC will use this IP address if it doesn't get an IP address via DHCP.

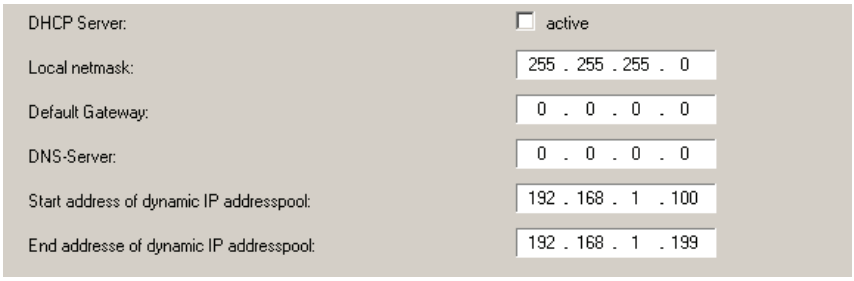
Own netmask

Enter the netmask for the ZDUE-MUC here.

DHCP server

➲ Data structure and parameters, see Chapter 21.34

The ZDUE-MUC can also serve as a DHCP server for a network or an individual device that is connected to Interface I3.


DHCP Server:
active
Local netmask:
255 . 255 . 255 . 0
Default Gateway:
0 . 0 . 0 . 0
DNS-Server:
0 . 0 . 0 . 0
Start address of dynamic IP addresspool:
192 . 168 . 1 . 100
End addresse of dynamic IP addresspool:
192 . 168 . 1 . 199

Click the checkbox marked *active* to activate the DHCP server and enter the other parameters of the DHCP server.

Attention

To make sure that there is no interference in the network, there can be only one active DHCP server in the network.

Local netmask

Enter the local netmask here that is to be allocated to the local applications.

Default gateway

Enter the default gateway here that is to be allocated to the local applications.

DNS server

Enter the DNS server here that is to be allocated to the local applications.

Start address of the dynamic IP pool

Enter the first address of the dynamic address pool here.

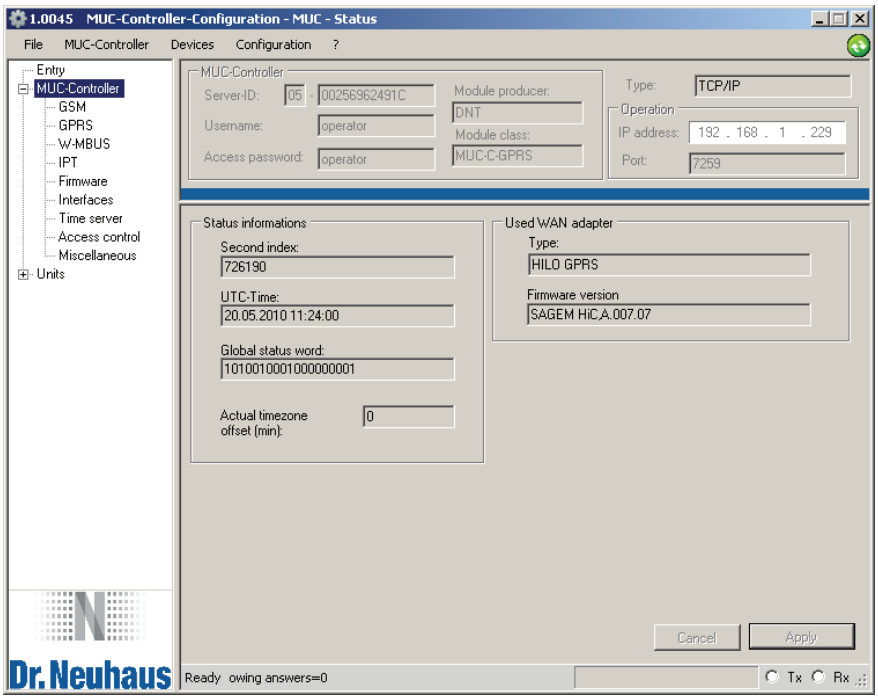
End address of the dynamic IP pool

Enter the last address of the dynamic address pool here.

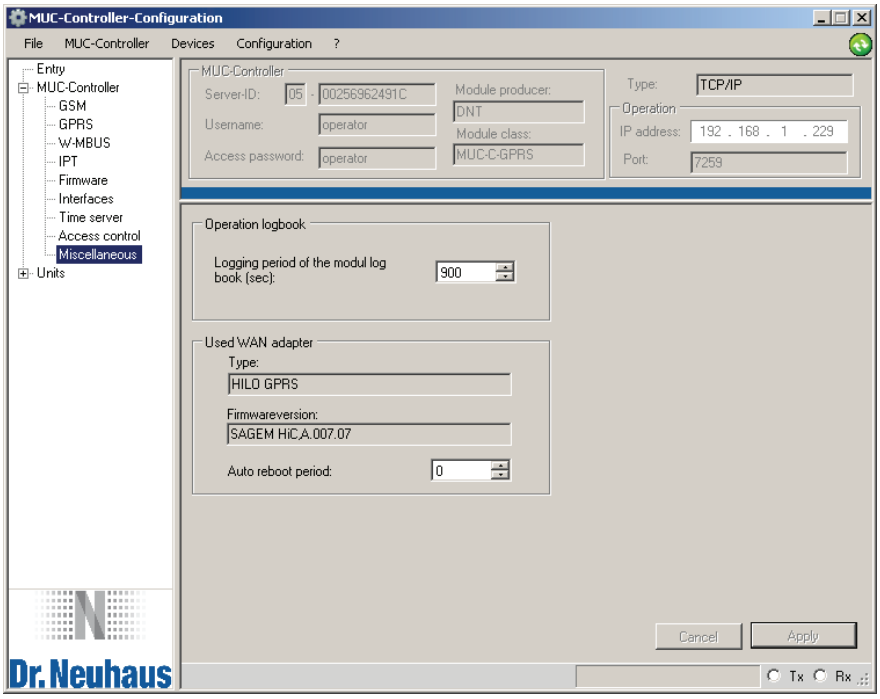
13 Miscellaneous

Set the parameters for different special functions here and view the status parameters.

MUC configuration software screen – MUC controller



MUC configuration software screen – Miscellaneous



13.1 Miscellaneous, Seconds Index, Global Status Word, Interface Name

Status information

Seconds index

➲ Data structure and parameters, see Chapter 21.2

The seconds index records the operating time of the ZDUE-MUC in seconds. The seconds index starts after the initialization of the ZDUE-MUC following a reboot and stops with a reboot or after a disconnection from the power supply.

During operation, the meter reading of the seconds index is saved every 15 minutes at the latest in a non-volatile memory. After a reboot, the seconds index is increased by 15 minutes so that no double meter readings will appear.

Global status word

➲ Data structure and parameters, see Chapter 21.2

The global status word is coded in binary form and provides information on different functions of the ZDUE-MUC.

Meaning for the ZDUE-PLC-MUC:

Status word bit	Meaning
Bit 0	Always “0”
Bit 1	Always “1”
Bit [7:2]	Always “0”
Bit 8	“1” if a fatal error has been detected. Must be explicitly deleted.
Bit 9	“1” if a reboot was initiated by a watchdog reset. Must be explicitly deleted.
Bit [13:10]	“0” for existing PLC connection to the MUC-DC.
Bit 14	“1” if “out-of-memory” error has occurred.
Bit 15	Always “0”
Bit 16	“1” for existing customer/service interface
Bit 17	“1” for existing extension interface
Bit 18	“1” for existing W-MBus interface
Bit 19	“1” for existing PLC interface

Meaning for the ZDUE-GPRS-MUC and the ZDUE-DC-MUC:

Status word bit	Meaning
Bit 0	Always “0”
Bit 1	Always “1”
Bit [7:2]	Always “0”
Bit 8	“1” if a fatal error has been detected. Must be explicitly deleted.
Bit 9	“1” if a reboot was initiated by a watchdog reset. Must be explicitly deleted.
Bit 10	“0” if logged into the GPRS service.
Bit 11	“0” if GSM network has been detected.
Bit 12	“0” if logged into the GSM network.
Bit 13	“0” for existing login to the IPT master.
Bit 14	“1” if an “out-of-memory” error has occurred
Bit 15	Always “0”
Bit 16	“1” for existing customer/service interface
Bit 17	“1” for existing extension interface
Bit 18	“1” for existing W-MBus interface
Bit 19	“1” for existing PLC interface

Meaning for the ZDUE-DSL-MUC:

Status word bit	Meaning
Bit 0	Always “0”
Bit 1	Always “1”
Bit [7:2]	Always “0”
Bit 8	“1” if a fatal error has been detected. Must be explicitly deleted.
Bit 9	“1” if a reboot was initiated by a watchdog reset. Must be explicitly deleted.
Bit 10	“0” if allocated an IP address from the network
Bit 11	“0” if Ethernet link exists
Bit 12	Always “0”
Bit 13	“0” for existing login to the IPT master.
Bit 14	“1” if an “out-of-memory” error has occurred
Bit 15	Always “0”
Bit 16	“1” for existing customer/service interface
Bit 17	“1” for existing extension interface
Bit 18	“1” for existing W-MBus interface
Bit 19	“1” for existing PLC interface

13.2 Period for Recording in the Operation Logbook

➲ Data structure and parameters, see Chapter 21.2

The ZDUE-MUC can periodically write status information into the operation logbook, see Chapter 21.36.

This parameter determines at what intervals such an entry is to be made.

If the parameter is set to 0, there will be no entries made periodically into the operation logbook.

Default setting: 900 (seconds)

13.3 WAN adapter used (types, firmware version, reboot)

The ZDUE-MUC has a modular design on the inside. The WAN adapter is the functioning block of a ZDUE-MUC; it sets up the connection to the control center.

In the ZDUE-PLC-MUC, the WAN adapter is a PLC modem. In the ZDUE-GPRS-MUC and the ZDUE-DC-MUC, the WAN adapter is a GPRS/GSM wireless module.

Type

➲ Data structure and parameters see Chapter 21.3.

The screen shows the type of WAN adapter used (only for the ZDUE-GPRS-MUC and the ZDUE-DC-MUC).

Firmware version

➲ Data structure and parameters see Chapter 21.3.

The screen shows the firmware version of the WAN adapter used.

Periods for automatic reboot

➲ Data structure and parameters see Chapter 21.4.

To prevent any unplanned interruptions to the control center connection or the unavailability of the ZDUE-MUCs, a parameter can be set for the periodic reboot of the WAN adapter. After the reboot, the ZDUE-once again sets up the connection to the control center or is ready to be called.

If a connection to the control center exists, the automatic reboot will be delayed until the connection is terminated. After this delay, the system will return to the original time schedule.

Set a parameter for the period (in seconds) after which the WAN adapter is to be rebooted. A typical value is 24 hours (86400 sec.).

If the value is set to 0, there will be no automatic reboot.

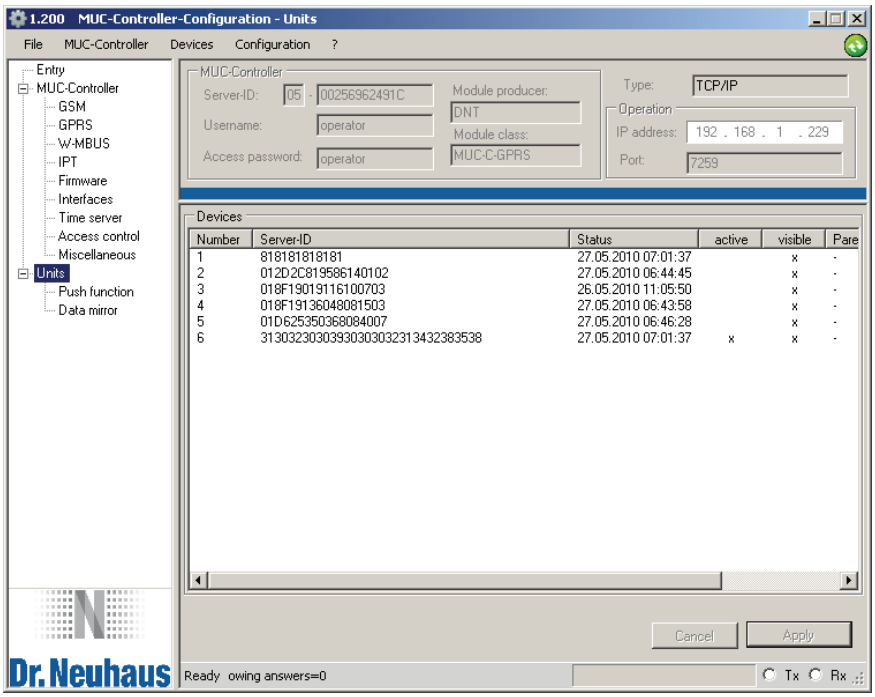
Default setting: 0 (seconds)

14 Devices (Visible and Activated Devices)

Under Devices, the MUC configuration software shows all the devices from which the ZDUE-MUC has received valid messages within the past 24 hours.

It also indicates whether or not these devices are activated.

MUC configuration software screen



Display

➲ Data structure and parameters, see Chapter 21.18 and Chapter 21.19.

Number

Consecutive number of the device

Server ID

Server ID of the device

The PC with the MUC configuration software is also considered as a visible device and is included in the list.

Module producer

The module producer reported by the device (FLAG code)

Module class

The module class reported by the device

Status

Time stamp (UTC) of the last message received by the device

Activated

This device is activated in the ZDUE-MUC, i.e. there is a data mirror for this device in which measurement data from the sensor is collected, for example. See Chapter 15.

Visible

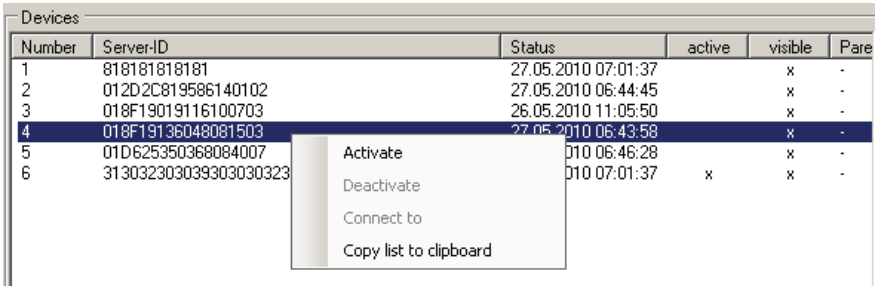
A valid message was received from the device within the last 24 hours. If the ZDUE-PLC-MUC or the ZDUE-GPRS-MUC does not receive a message from the device within 24 hours, the device will no longer be marked as visible. If the device is not active, it will be removed from the list.

A device still remains visible on the ZDUE-DC-MUC when it is no longer visible on the corresponding ZDUE-PLC-MUC, but a data mirror has been created for the device and this data mirror was reached in the past 24 hours.

Parent server ID

The Parent column for a ZDUE-DC-MUC indicates the server ID of the ZDUE-PLC-MUC to which a device is connected.

Activate / Deactivate / Connect to



If an entry is marked in the device list, you can open a context menu by clicking the right mouse button.

Activate – Activates the device in the ZDUE-MUC, i.e. es wird ein Datenspiegel für die Messstelle im ZDUE-MUC angelegt, see Chapter 15.

Deactivate – Deactivates the device in the ZDUE-MUC. It is no longer possible to access the data in the data mirror; collected data can no longer be pushed.

Connect to – This option is only available in the list of a ZDUE-DC-MUC. If you select a ZDUE-PLC-MUC, the MUC configuration software will set up the connection to the ZDUE-DC-MUC and to the ZDUE-PLC-MUC selected.

Copy list to clipboard – The device list on display will be copied into the Windows clipboard and can then be put into an Excel spreadsheet, for example.

15 W-MBus Settings

The ZDUE-MUC is optionally equipped with a transmitter and receiver (transceiver) for the wireless M-Bus (W-MBus) to communicate with W-MBus sensors and actuators.

Thanks to the W-MBus, meters with a W-MBus transmitter, for example, can transmit their usage data wirelessly to the ZDUE-MUC.

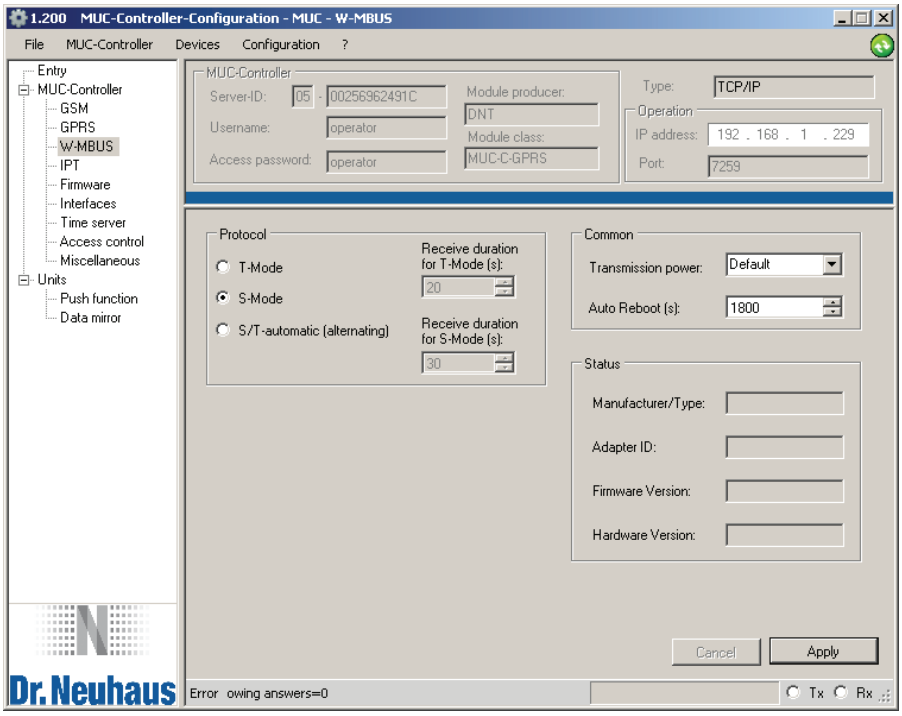
The W-MBus transceiver in the ZDUE-MUC uses the ISM frequency band at 868 MHz. The W-MBus S and T transmission modes are supported.

The ZDUE-MUC can communicate with sensors and actuators that follow the standards of the Open Metering Specification (Volume 2), whereby the ZDUE-MUC supports SML as well as Wireless MBus as the application protocol.

Devices whose data is received by the ZDUE-MUC via the W-MBus are entered in the list of visible devices. Data mirrors and data collectors can be created for these devices.

Parameterization

The functioning of the W-MBus transceiver in the ZDUE-MUC can be influenced by setting different parameters:



Wireless protocol

The ZDUE-MUC supports the following W-MBus operating modes:

S1 mode, unidirectional to the ZDUE-MUC, 16.385 baud

T1 mode, unidirectional to the ZDUE-MUC, 66.667 baud

S2 mode, bidirectional from/to the ZDUE-MUC, 16.385 baud

T2 mode, bidirectional from the ZDUE-MUC / 66.667 baud (TX),
bidirectional to the ZDUE-MUC / 16.385 baud (RX)

The S2 mode is supported only with a long preheader.

S mode: The ZDUE-MUC transmits and receives in the S mode only.

T mode: The ZDUE-MUC transmits and receives in the T mode only.

S/T automatic (alternating): The ZDUE-MUC search alternating in both operating modes for messages received via the W-MBus. How long the ZDUE-MUC searches in each mode can be set using the following parameters: *Receive duration for T mode* or *Receive duration for S mode*.

General information

Transmission power: The transmission power of the W-MBus transceiver can be adjusted: Select from *Default, Low, Medium and High.*

Auto reboot: Enter the interval in seconds after which the W-MBus transceiver in the ZDUE-MUC should reboot. If you enter 0, the system will not reboot.

Status

If readable, the following status information on the W-MBus transceiver in the ZDUE-MUC will be displayed:

- Manufacturer / type of W-MBus transceiver in the ZDUE-MUC
- Adapter ID (wireless MBus identifier)
- Hardware version of the W-MBus transceiver in the ZDUE-MUC
- Software version of the W-MBus transceiver in the ZDUE-MUC

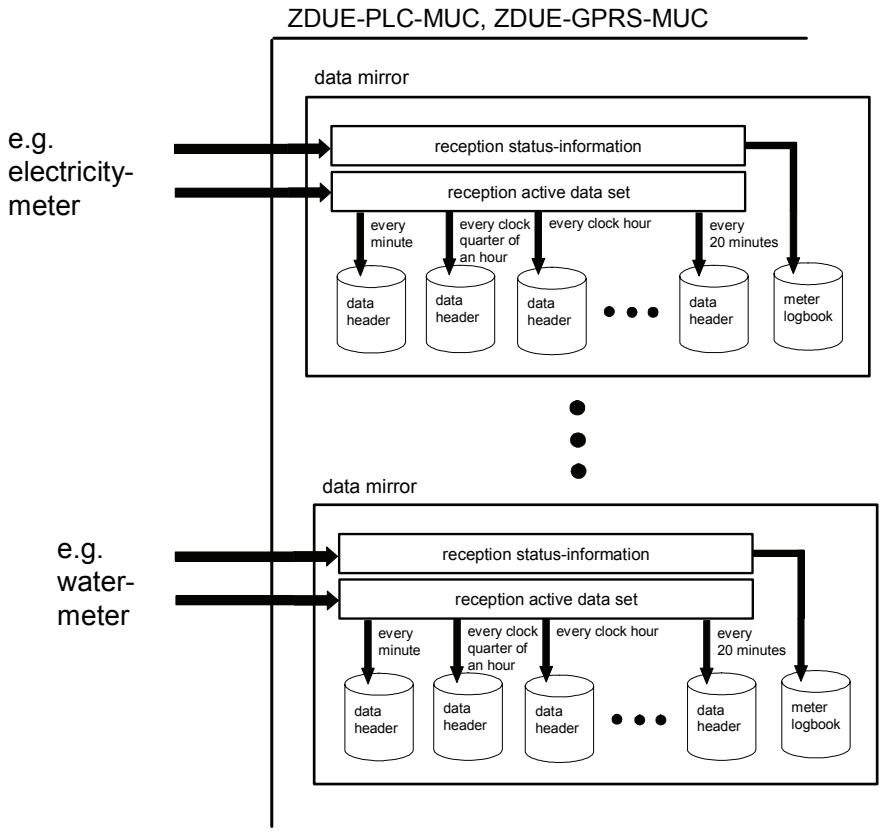
16 Management of Devices, Data Mirrors and Data Collectors

The main task of the ZDUE-MUC-GPRS and the ZDUE-MUC-PLC is to collect usage data from any devices connected, such as electricity, gas and water meters, and to then make this information available.

So that they can do this job, it is necessary to tell the ZDUE-MUC-GPRS and the ZDUE-MUC-PLC from which devices they are to collect the information.

Data mirror

A data mirror has to be created for each device that is connected to the ZDUE-MUC, both wired and wireless. Otherwise, the ZDUE-MUC will not be able to receive and process the data sent from the devices.



The SML server ID of the device, e.g. the eHZ, must be allocated to the data mirror.

The data mirror has a register for the current data set to save the last set of data received from the device and also collects status information from the meter.

Several data collectors can be created for one data mirror. They save the event-driven or periodically collected usage data for the current data set.

Data collector

When a “defined event” occurs, the data collector saves selected usage data in the current data set.

Such “defined events” can include e.g. the full quarter of an hour, the full hour, the day change, etc.

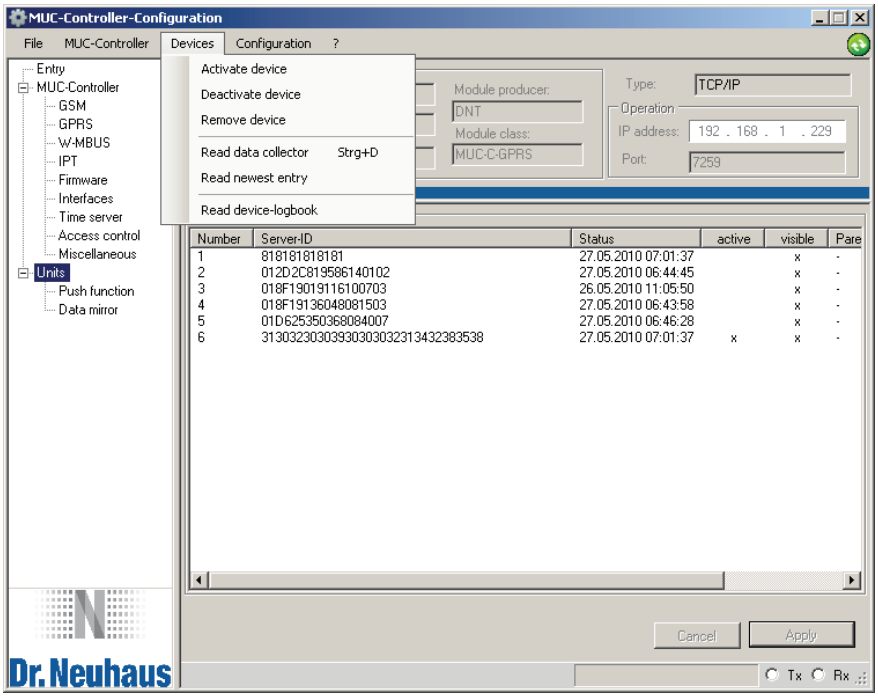
The information in the data set that is to be stored is defined via its OBIS values.

A number of register periods must be entered for each data collector, which the data collector must be able to record. This defines the memory depth of the data collector, i.e. it determines how many (partial) dataset can be saved in one data collector. If the data collector is full, the oldest entry will be deleted.

Management of the data mirror

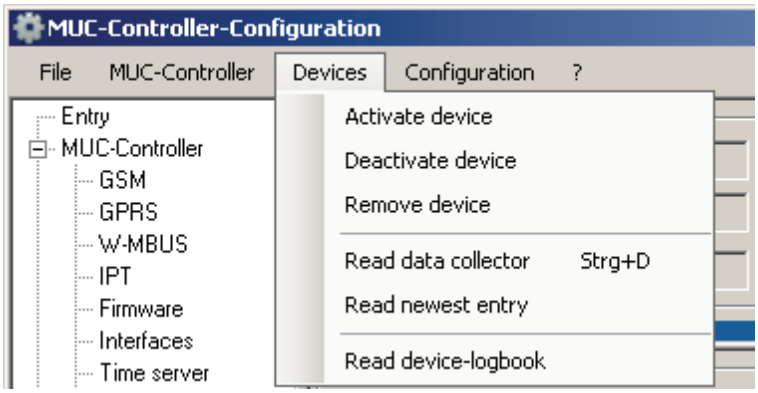
To manage the data mirror, open the “Devices” screen.

MUC configuration software screen



Activation of a data mirror

To activate a data mirror for a device, select *Activate device* in the *Devices* menu.



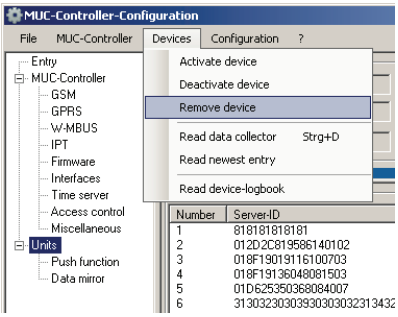
Enter the server ID for the device for which you want to create a data mirror and click OK. This creates the data mirror and it will be marked as active in the “Devices” menu.

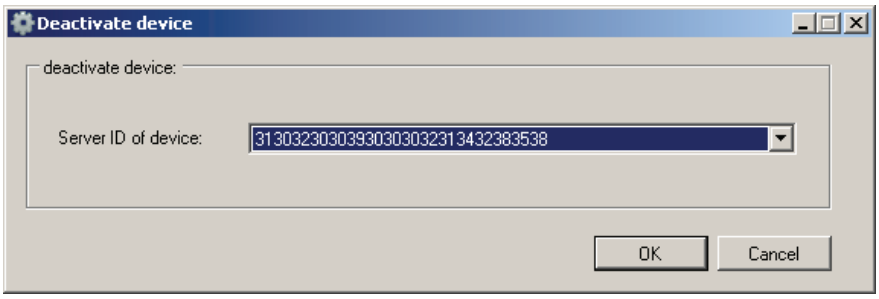
It is not necessary for the device to already be visible for the ZDUE-MUC before you can activate the device.

Devices that are connected to the eHZ interface are activated automatically.

Deactivation of a data mirror

To deactivate a data mirror for a device, select *Deactivate device* in the *Devices* menu.



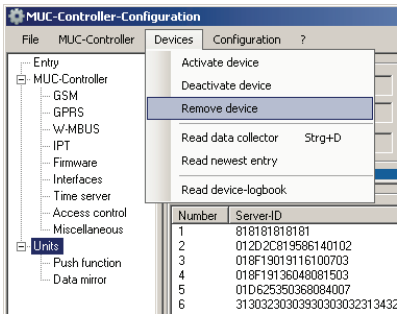


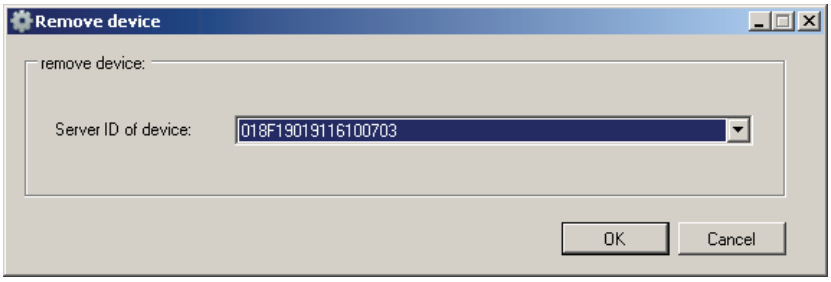
Select the server ID of the device for which you want to deactivate the data mirror.

The data mirror for the device will be deactivated; however, its settings will be saved for a renewed activation.

Removing a data mirror

To remove a data mirror for a device, select *Remove device* in the *Devices* menu.

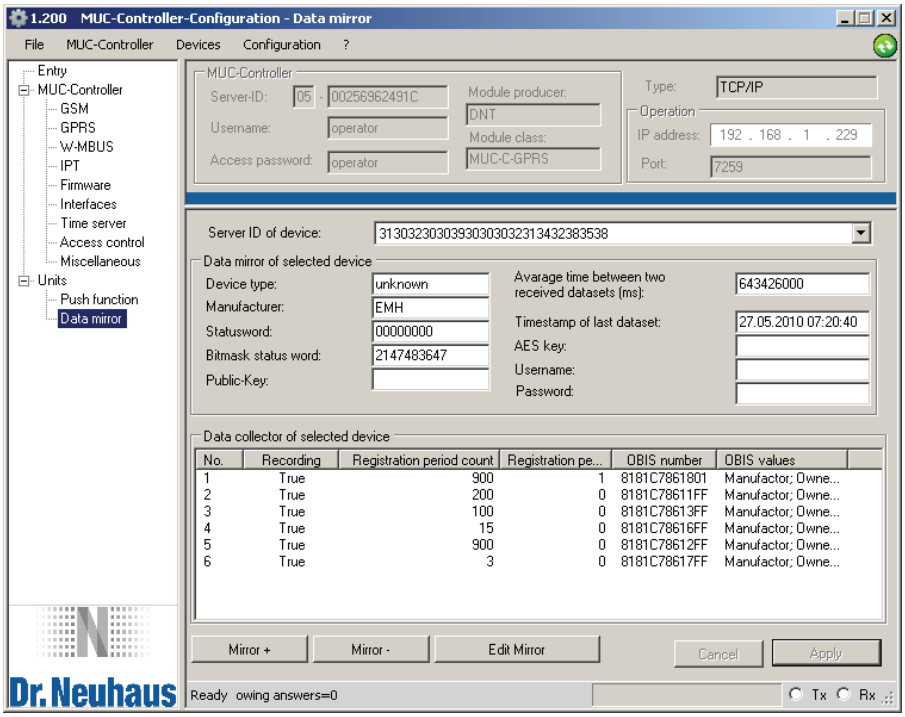




Select the server ID of the device for which you want to remove the data mirror.

The status of the device will be indicated in the *Data mirror* screen.

Data mirror screen



➲ Data structure and parameters see Chapter 21.29.

Server ID of device

Select the server ID of the device whose status you want to see.

Module class, module producer

Module class and producer of the device, if registered.

Status word

Status word (display in bits) of the device, if registered. The status word of the device is adopted. For more information, please refer to the documentation for the meter.

Bitmask status word

Bitmask of the status word, which can be used to select the changes of which bits of the status word will result in an entry in the device logbook.

Example:

Bit:	7 6 5 4 3 2 1 0
Status word:	0 1 0 0 1 0 0 1
Bitmask:	0 0 0 1 0 0 0 1

Changes in Bit 4 and 0 will result in an entry in the device logbook.

Bitmask status word two data sets received

Gives the average of the interval at which the device transmits data sets to the ZDUE-MUC.

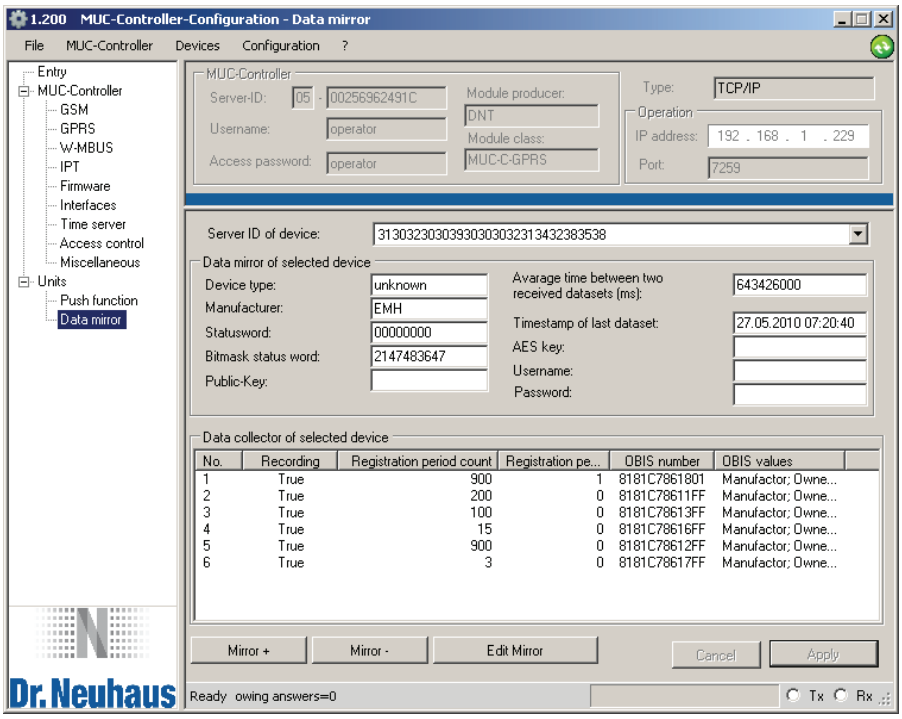
Public key, AES key

Enter the public key or the AES key if this is necessary for communication with the device.

Adding, removing, editing the data collector

If a data mirror has been created for a device, it is also possible to create data collectors for that device. A data collector is event-driven and saves the last (most current) data set received from the device.

Several different data collectors can be created for every device to record the data sets at different times, e.g. the 15-minute usage data after each quarter of an hour or hourly data after each full hour.

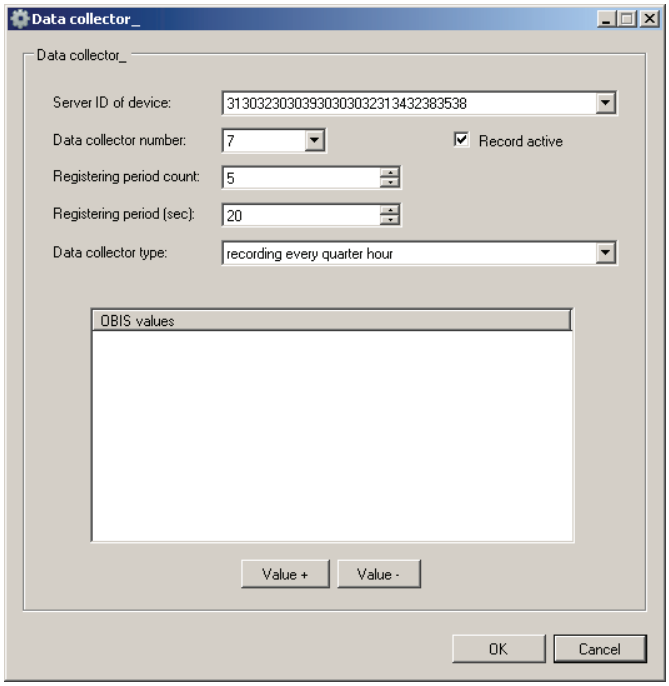


➲ Data structure and parameters, see Chapter 21.29

Adding a data collector

Data collector+

Click on the Data collector+ to add a new data collector.



Registering period count

Entry the memory depth of the data collector by indicating the maximum number of registering periods. One data set is saved with the time for each registering period. If the maximum number of registering periods has been reached, the oldest data sets will be overwritten.

Registering period (sec)

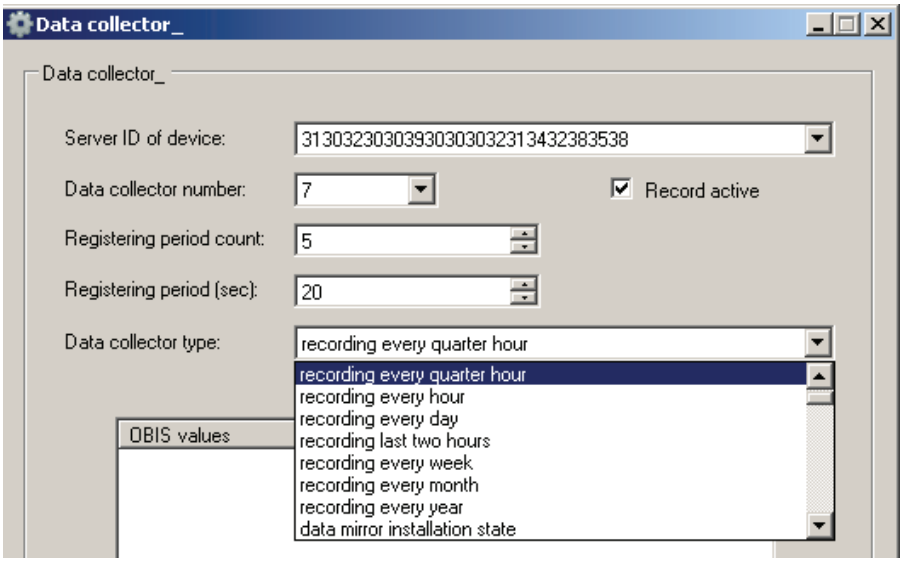
If the data sets are to be saved with a free registering period, enter the period in seconds here.

Example: If you select 600 seconds, a data set will be set every 600 seconds from the moment the ZDUE-MUC is configured.

If you enter 0 here, the information will not be saved with a free registering period but rather event-driven with the attributes determined under Data collector type in the following.

Data collector type

Select the event for which a data set is to be saved in the data collector.

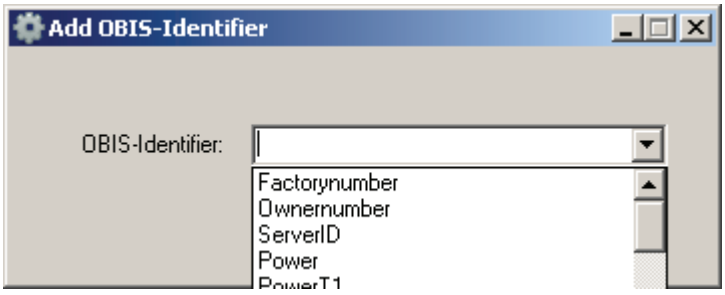


Item	OBIS value	Meaning
1	81 81 C7 86 10 FF	Standard load profile with registering periods and meter readings by the minute (recording at the full minute)
2	81 81 C7 86 11 FF	Standard load profile with ¼ h registering periods and meter readings (recording at the full ¼ hour)
3	81 81 C7 86 12 FF	Standard load profile with 1 h registering periods and meter readings (recording at the full hour)
4	81 81 C7 86 13 FF	Standard load profile with 24 h registering periods and meter readings (recording on day change)
5	81 81 C7 86 14 FF	Event memory with meter readings / events from the past 2 hours
6	81 81 C7 86 15 FF	Event memory with weekly recorded meter readings / events (recording on day change from Sunday to Monday)
7	81 81 C7 86 16 FF	Event memory with monthly recorded meter readings / events (recording on month change)
8	81 81 C7 86 17 FF	Event memory with annually recorded meter readings / events (recording at year change)
9	81 81 C7 86 18 FF	Event memory with installation meter reading of the meter connected
10	81 81 C7 86 18 NN	Event memory with free-running registering period and recorded meter readings / events Values range for NN: 0x01 to 0x0A

Value+

Add a value that is then part of the data set and saved in the data collector. At least one value must be entered.

You can select one of the predefined values or add the OBIS identifier of a value yourself.

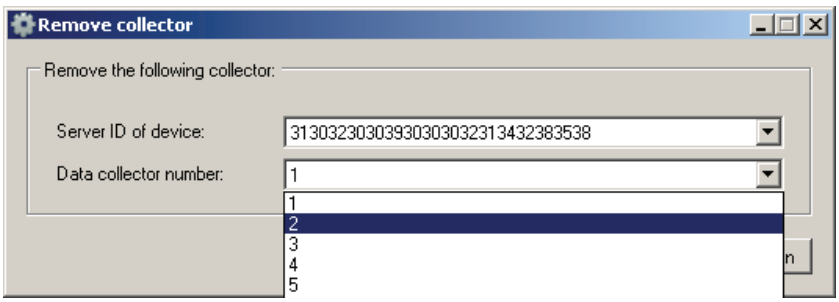


Value-

Use Value- to remove a value that is collected in the data set.

Removing a data collector

Click *Data collector-* to delete a data collector.

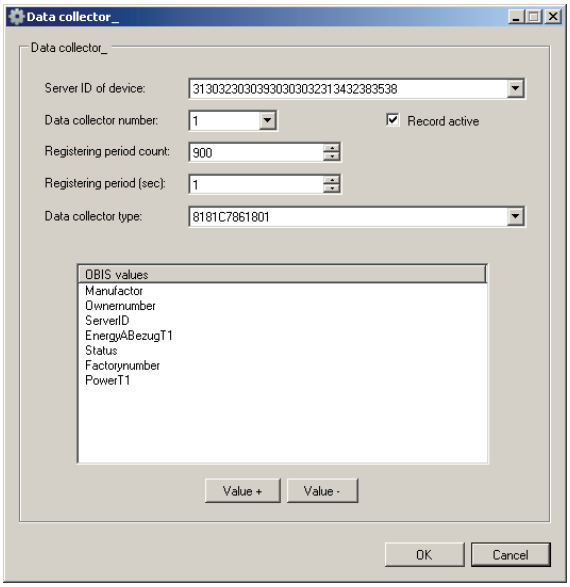


Select the data collector to be deleted by its data collector number.

All the data saved in the data collector will be deleted.

Editing a data collector

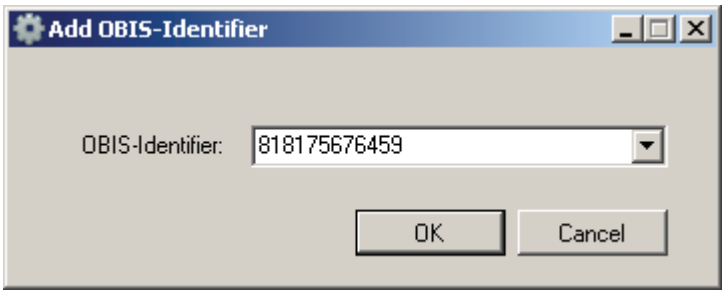
Click *Edit data collector* to edit the settings of a data collector.



Select the data collector using the server ID of the device and the data collector number and edit the attributes of the data collector, e.g. the number of registering periods, etc.

Value+

Click *Value+* to add another value to the data collector, whereby there are no limitations to the predefined values shown. You can also enter the OBIS identifier of the value to be recorded directly into the input screen.



Installation meter reading

Once a data mirror has been created, the first data set received from the allocated meter will be saved in a non-volatile memory as the installation meter reading in a data collector with the following data collector ID: 81 81 C7 86 18 FF.

The memory for the installation meter reading can be reset with the “Empty data collector” command.

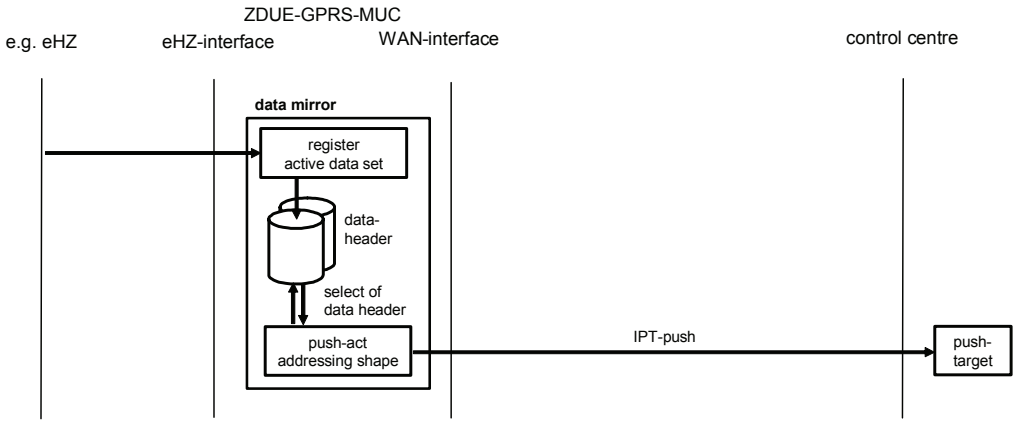
17 Push Function

17.1 Pushing collected usage data

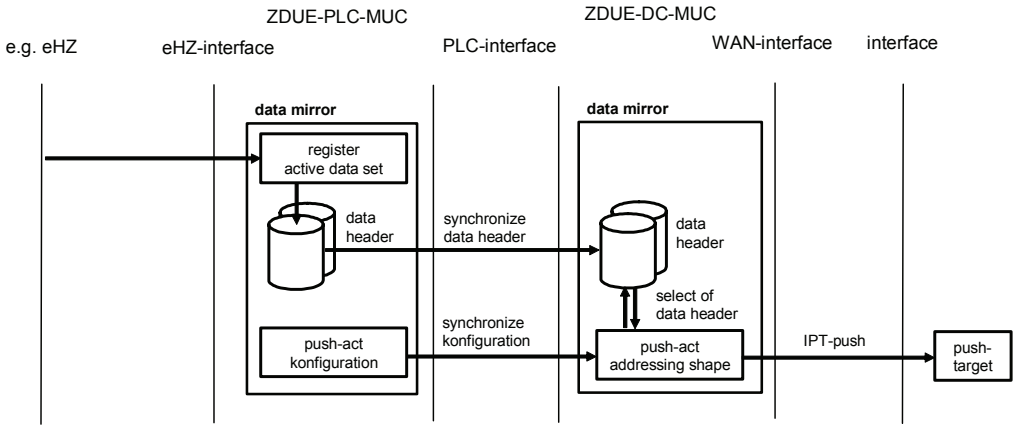
The push mode is supported by all the ZDUE-MUCs. In push mode, the ZDUE-MUC independently reads out the data collected in a data collection in the push function and transmits it to a push destination in the control center. The push channel of the IPT protocol is used for this purpose.

Parameters can be set for 20 different push functions for every device connected that is allocated to a data mirror.

“Addressed profile” push process for the ZDUE-GPRS-MUC



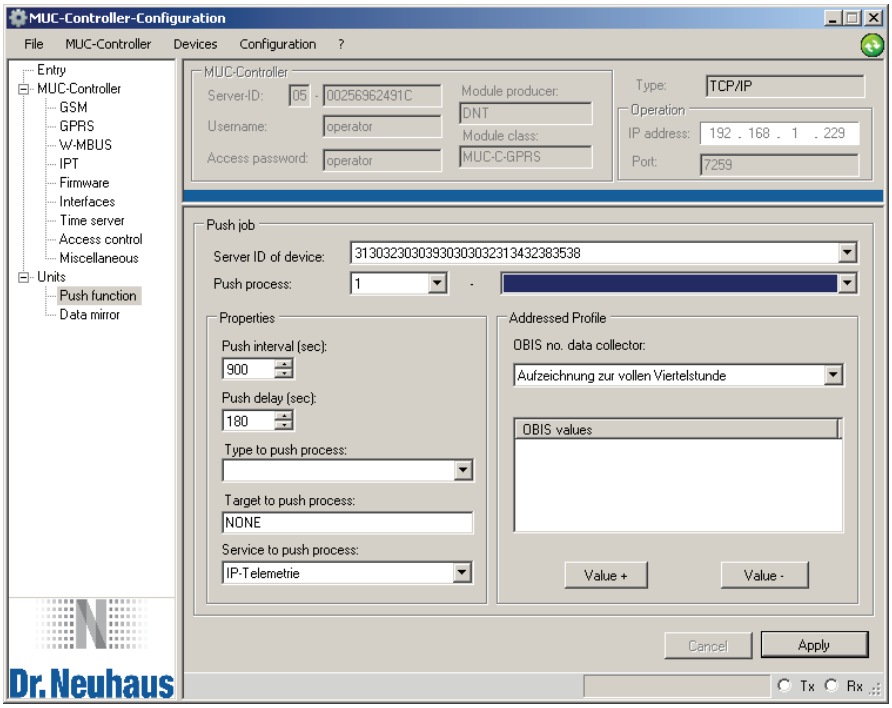
“Addressed profile” push process for the ZDUE-PLC-MUC



The ZDUE-GPRS-MUC performs the IPT push processes directly. The push processes access the data collectors and transmit the addressed data sets via the IPT push channel to the push target selected.

The ZDUE-PLC-MUC cannot push any data to the control center itself because it doesn't have direct access to an IPT push channel. That's why it transmits the contents of its data collector as well as the parameters for the push process (push target, push interval, etc.) via the synchronization to the PLC network (see Chapter 8.6) on a regular basis to the ZDUE-DC-MUC. The ZDUE-DC-MUC executes the IPT push process.

MUC configuration software screen



Parameterization of the push process

Set the parameters for the push processes to transmit the corresponding data to the control center in the ZDUE-GPRS-MUC and the ZDUE-PLC-MUC.

Server ID of device

➲ Data structure and parameters see Chapter 21.17.

Select the server ID of the device whose data is to be sent to the push target in the control center. It is necessary to have created a data mirror and a data collector for the device previously, see Chapter 10.

Push process

➲ Data structure and parameters see Chapter 21.17.

Select the push process that you want to create or set up. You can create up to 20 different push processes for each device or each data mirror.

Activate or deactivate the push process.

Type of push process

➲ Data structure and parameters see Chapter 21.17.

Select the Addressed profile to transmit data sets from the device to the push target in the control center.

OBIS no. data collector

➲ Data structure and parameters see Chapter 21.17.

Set the parameters for the data collector whose contents are to be pushed. It is possible to transmit the contents of all the data collectors that have been previously created, see Chapter 10.

OBIS values

➲ Data structure and parameters see Chapter 21.17.

Set the parameters for the OBIS values of the devices that are to be transmitted in a push process. If no value is entered, all of the values collected in the data set will be transmitted.

Target to push process

➲ Data structure and parameters, see Chapter 21.17.

Set the parameters for the IPT push target for the push process to the control center that is connected with the IPT master and set up there.

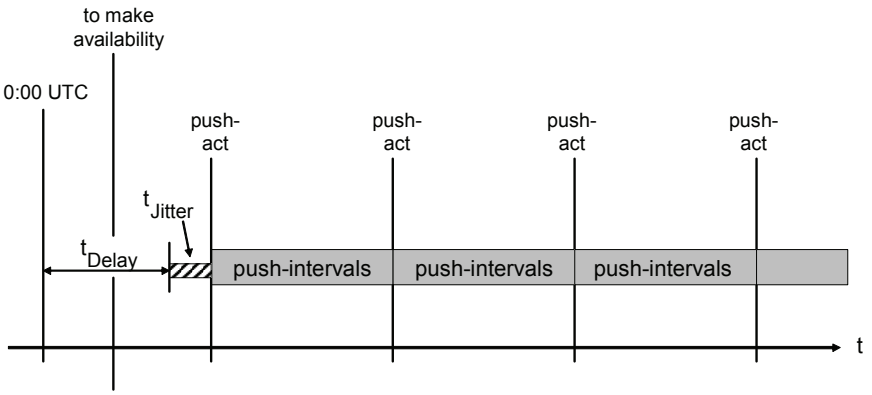
Service to push process

➲ Data structure and parameters see Chapter 21.17.

Set the parameters for the service to the push process here. For the current ZDUE-MUC, only IP telemetry is used as a service.

Behavior of periodical push processes (after standby has been established)

The push processes to the addressed profile are interval-driven. As soon as the ZDUE-MUC is synchronized with the UTC time, the push intervals are synchronized daily to 0:00 UTC.



The first push process takes place after the push delay (t_{Delay}) and after a jitter (t_{Jitter}). The jitter t_{Jitter} is set automatically according to the following rule:

formula:

$$t_{Jitter} = ID \times \frac{1,4}{8640} \times t_{intervals}$$

example:

$$t_{Jitter} = 255 \times \frac{1,4}{8640} \times 86400\ s = 3570\ s \Rightarrow ca.\ 1h$$

Server ID = 05 00 60 4C C7 1C (FF)

ID corresponds to the last two letters in the server ID.

If a push interval is smaller than 1 hour, t_{Jitter} is set to 0.

Note:

With the push delay, you can, for example, set the first push process to always take place at 10 am (UTC) incl. a t_{Jitter}.

Push interval

➲ Data structure and parameters see Chapter 21.17.

Set the parameter for the push interval $t_{Interval}$ in seconds.

Permissible range: 1…. 86400.

At 0, the push takes place immediately after the reception of new data in the selected push source.

Note:

The push immediately on the reception of new data can be used, for example, to push the monthly data to the control center directly after they have been received.

Push delay

➲ Data structure and parameters see Chapter 21.17.

Set the parameters for the push delay t_{Delay} in seconds.

17.2 Push of System Information

In addition to pushing usage data, the ZDUE-MUCs can also spontaneously transmit installation parameters as well as the list of visible and activated devices (See Chapter 14) to the control center.

Installation parameters

When pushing the installation parameters, the ZDUE-MUC (except for the ZDUE-PLC-MUC) transmits parts of the device identification (see Chapter 21.17) after on standby to the select push target.

Pushing the lists of the visible and activated devices

The ZDUE-MUC (except for ZDUE-PLC-MUC) transmits the list of the visible devices and the list of the activated devices via push to a configured push target. To do so, these lists must be selected as types for the push process when creating the push process.

The complete device lists (81811006FFFF; 81811106FFFF) are transmitted at the push interval indicated. In addition, any changes made to the lists will be pushed immediately after the change is made:

- List of new visible devices : 81811016FFFF
- List of no longer visible devices: 81811026FFFF
- List of new activated devices: 81811116FFFF
- List of no longer activated devices: 81811126FFFF

Parameterization of the push process

To push the installation parameters, make the following settings:

Server ID of device

➲ Data structure and parameters, see Chapter 21.17.

Select the ZDUE-MUC's own server ID if this device is to transmit its installation parameters to the control center.

Push process

➲ Data structure and parameters, see Chapter 21.17.

Select the push process that you want to create or set up. You can create up to 20 different push processes for each device or each data mirror.

Activate or deactivate the push process.

Type of push process

➲ Data structure and parameters, see Chapter 21.17.

Select the installation parameter to transmit the device identification of the ZDUE-MUC to the push target at the control center.

Target to push process

➲ Data structure and parameters, see Chapter 21.17.

Set the parameter for the push process to the control center for the IPT push target that is connected with the IPT master and set up there.

Service to push process

➲ Data structure and parameters, see Chapter 21.17.

Set the parameter for the service to the push process. For the current ZDUE-MUCs, IP telemetry only is used as the service.

Push interval

➲ Data structure and parameters, see Chapter 21.17.

It is not necessary to indicate the push interval when pushing the installation parameters. The push takes place once the system is ready to operate.

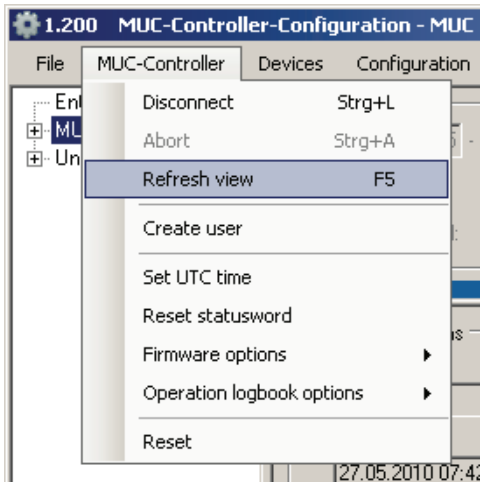
Push delay

➲ Data structure and parameters, see Chapter 21.17.

Set the parameter for the push delay in seconds.

18 MUC Controller

The *MUC Controller* menu contains different operating functions for a ZDUE-MUC:



18.1 Create user

Select *Create user* to add a new user to the access control of the ZDUE-MUC.

This procedure is described in more detail in Chapter 10.

18.2 Set UTC time

Select *Set UTC time* to set the time server in the ZDUE-MUC manually. The time server in the ZDUE-MUC will then be set to the UTC time of computer on which the MUC configuration software is run.

As a result, the ZDUE-MUC maintains the set UTC time until there has been a synchronization with an external time server via NTP or PLC.

Attention:

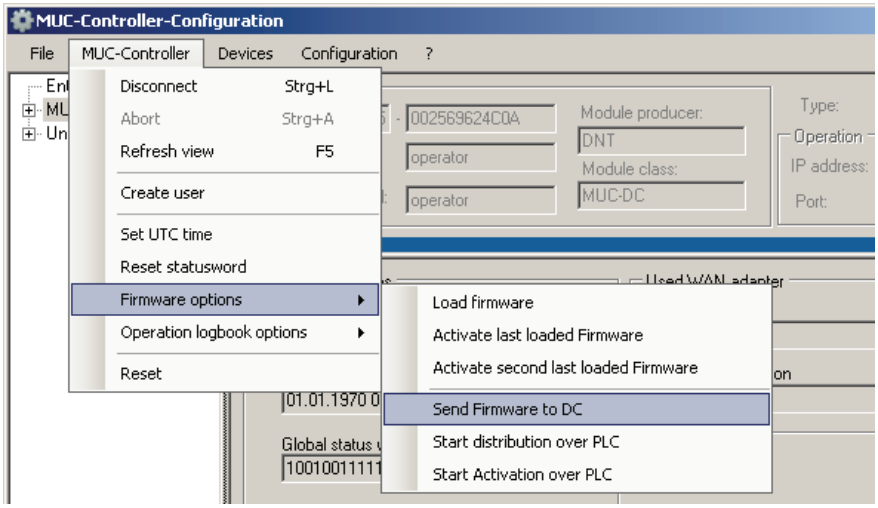
When you use *Set UTC time,* you can reset the time server in the ZDUE-MUC even when it is synchronized via NTP or PLC. In doing so, you might overwrite the exact time.

18.3 Reset status word

Select *Reset status word* to reset the writable bits of the status word. For more information, please refer to Chapter 13.1.

18.4 Firmware options

Select *Firmware options* to manage the device firmware of the ZDUE-MUC.



The functions available here can be used to load firmware into the ZDUE-MUC with which the MUC configuration software is directly connected and to activate firmware. You can also load firmware into a ZDUE-MUC-DC and then send this firmware to the ZDUE-MUC-PLCs connected and activate it.

Load firmware into the device

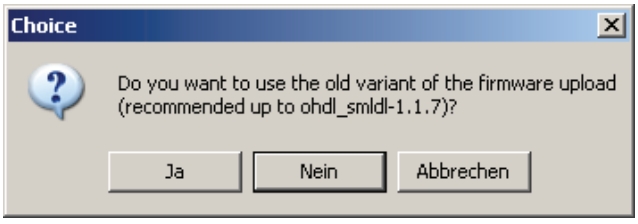
➲ Data structure and parameters see Chapter 21.25.

Select *Load firmware* to load new firmware into the ZDUE-MUC.

Select the file containing the new firmware and start the transmission of the firmware into the device.

Example: MUC-GPRS-1103.sml

The following query will appear:



If firmware < 1.3xx is running on the ZDUE-MUC, click *Yes*. For firmware later than Version 1.3xx, select *No.*

Activate new firmware / Activate previous firmware

➲ Data structure and parameters see Chapter 21.25.

The ZDUE-MUC can save two firmware versions at the same time,

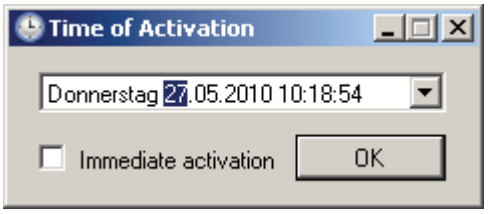
- Last loaded firmware (shown as INSTALLATION [0])
- Second last loaded firmware (shown as INSTALLATION [1])

When new firmware is loaded, this automatically becomes the last loaded firmware. The firmware loaded prior to that is the second last loaded firmware.

To activate one of the two firmware versions, select *Firmware options* in the *MUC Controller* menu

- Activate last loaded firmware or
- Activate second last loaded firmware.

Once you have made your selection, you will be asked for the time at which the activation is to take place.



Enter the date and the time at which the ZDUE-MUC is to activate the selected firmware. The ZDUE-MUC will then automatically activate the firmware at the given time.

If you want to immediately activate the firmware, click the box marked *Immediate activation*.

Send firmware to DC / Start distribution over PLC

Select *Send firmware to DC* to download new firmware to the ZDUE-DC-MUC, which will then distribute this firmware to the ZDUE-PLC-MUCs connected to it.

Select the file containing the new firmware and start the transmission of the firmware to the ZDUE-DC-MUC.

Then select *Start distribution over PLC* so that the ZDUE-DC-MUC sends this firmware to the ZDUE-PLC-MUCs connected.

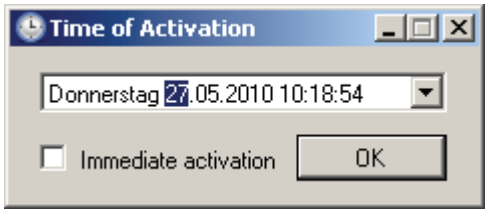
Attention:

Distributing the firmware in a PLC network with approx. 50 ZDUE-MUCs takes several days, in a network with more than 100 ZDUE-MUCs more than a week. During this time, there will be hardly any meter data transmitted in the PLC network.

Start PLC activation

Then select *Start PLC activation* to activate the firmware distributed to the ZDUE-PLC-MUCs in the ZDUE-PLC-MUCs at the same time.

Enter the time of activation.



Attention:

The distribution of the activation command in a PLC network with approx. 50 ZDUE-MUCs takes several days. Select the time of activation so that there is enough time remaining for the distribution.

Attention:

At the time this manual was written, the distribution of the activation command was not yet completely implemented. If the activation of the distribution mechanism should fail, you can activate the firmware distributed individually as described under *Activate new firmware / Activate previous firmware*.

18.5 Operation logbook options

Function

Important operating events for the ZDUE-MUC are saved in the operation logbook.

All the ZDUE-MUCs write status information into the logbook when one of the defined events takes place.

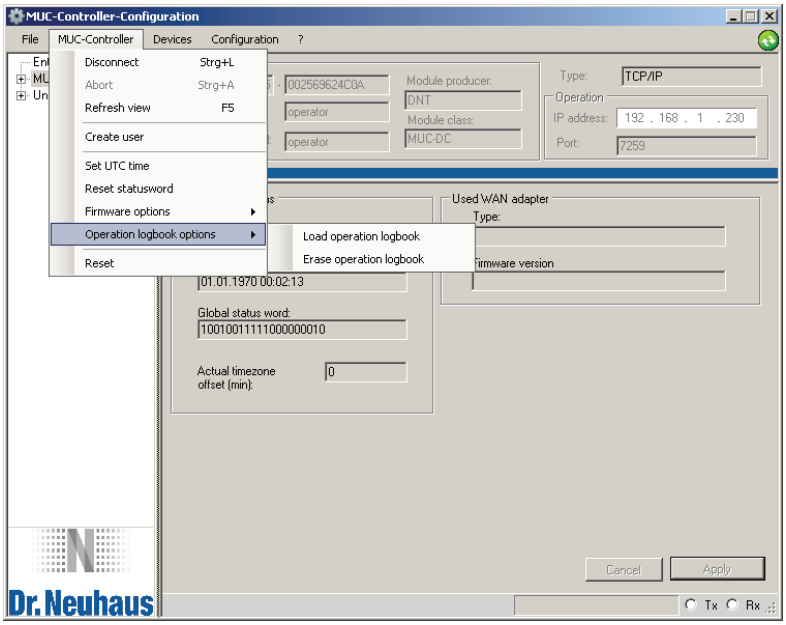
If the parameters have been set to do so, the ZDUE-MUCs also write entries into the logbook periodically.

Logbook information

The following information is written into the logbook periodically:

- Seconds index reading
- Status word
- Trigger event
- Peer address (source of the event)
- Only for GSM/GPRS: Current field strength
- Only for GSM/GPRS: Cell identifier
- Only for GSM/GPRS: Location area code
- Only for GSM/GPRS: Current operator identifier

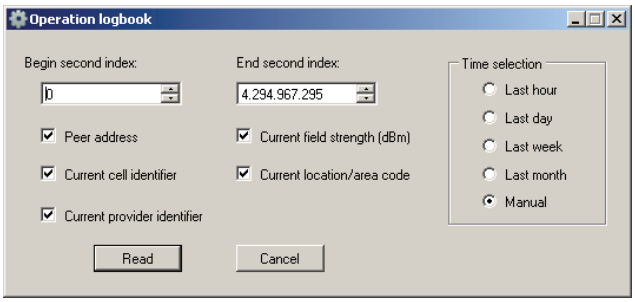
A list of the events that trigger a logbook entry can be found in Chapter 21.36.



Load operation logbook

➲ Data structure and parameters see Chapter 21.36.

Select *Load operation logbook* to download the operation logbook from the ZDUE-MUC to the computer.



Enter the time range for the second index and the information you want to download.

The operation logbook is saved to the computer as a CSV file and can be opened with e.g. Excel.

Erase operation logbook

➲ Data structure and parameters see Chapter 21.36.

Select *Erase operation logbook* to delete the operation logbook in the ZDUE-MUC.

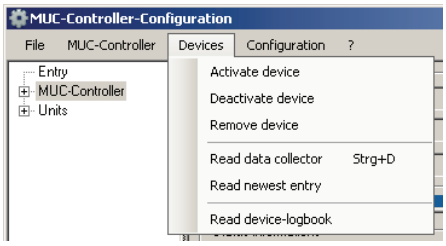
18.6 Reset

➲ Data structure and parameters see Chapter 21.23.

Select *Reset* to send the order to reboot to the ZDUE-MUC.

19 Devices

Under *Devices* you will find different functions to operate the devices connected and the corresponding data mirrors and data collectors.



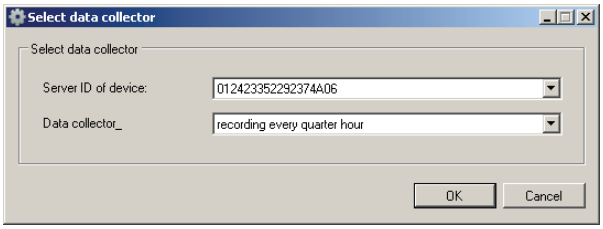
19.1 Activate, deactivate, remove devices

The options for *Activate device, deactivate device, remove device* serve to manage the devices, data mirrors and data collectors.

For a more detailed description, please refer to Chapter 16.

19.2 Read data collector

Select *Read data collector* to read out the data stored in a data collector.



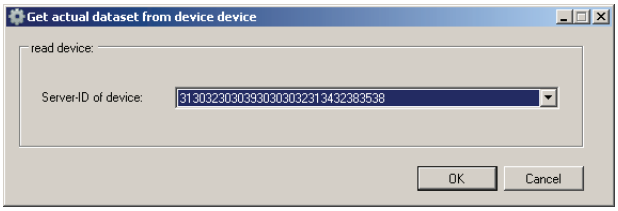
➲ Data structure and parameters see Chapter 21.37.

To read out the data collector, enter the server ID of the device and the data collector.

The information will be read out of the data collector and saved in a CSV file.

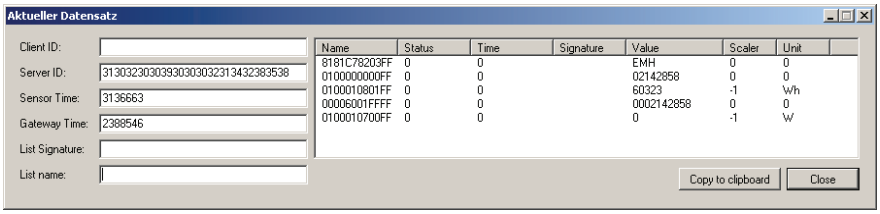
19.3 Read newest entry

Select *Read newest entry* to read out the last dataset received by the device.



➲ Data structure and parameters see Chapter 21.38.

To read out the current dataset, enter the server ID of the device. The ZDUE-MUC will then deliver the most current dataset:

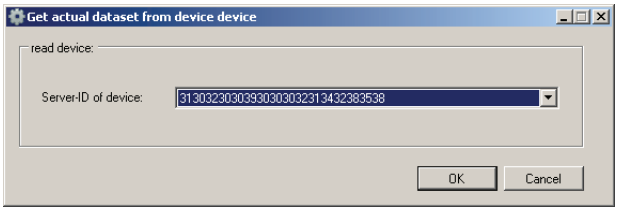


19.4 Read device logbook

Select *Read device logbook* to read out the operation logbook of the data mirror of a device.

➲ Data structure and parameters see Chapter 21.39.

The device logbook records such things as any changes made to the status word sent by the device.

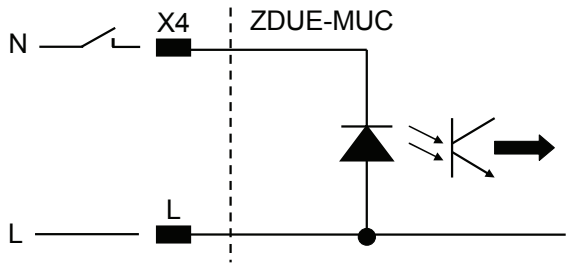


To find out more about the status information stored, please refer to the documentation for the device (meter).

20 Other Functions

20.1 Rate-change gate input

Depending on the status at the X4 gate input, the MUC controller will send the SML message on a change in the rates to the electricity meter that is connected to the eHz interface.



If the X4 gate input is open, no message on the rate change will be sent.

If the X4 gate input is connected with the neutral line (N), the ZDUE-MUC will send a rate-change command to the electronic household meter approx. every 45 s after a dataset has been received from the meter.

The rate-change command corresponds to the FNN specs EDL Version 1.0, Table 12. The system will switch over to Rate 2.

21 Technical Reference

Attention:

Individual data structures and parameters might not yet be supported in the firmware of your ZDUE-MUC.

21.1 Information on using the SML protocol

SML version

The ZDUE-MUC uses Smart Message Language (SML), Version 1.03 as its application protocol.

Addressing

Every ZDUE-MUC is uniquely identified by its server ID. The server ID is printed on the front of each ZDUE-MUC. It has to be entered accordingly in the SML files and SML messages according to the SML protocol.

SML files and SML messages must be addressed to the server ID of the target device they are being sent to. An SML file or SML message to a ZDUE-MUC must be addressed to the server ID of the ZDUE-MUC, an SML message to a device connected to a ZDUE-MUC must be sent to the server ID of the device.

SML messages used

The MUC Controller supports the following SML message types:

- OpenRequest, OpenResponse
- CloseRequest, CloseResponse
- GetListRequest, GetListResponse
- GetProfileListRequest, GetProfileListResponse
- GetProcParameterRequest, GetProcParameterResponse
- SetProcParameterRequest
- AttentionResponse

All response messages can also be sent as SML-Response without Request.

Optional elements used for SML messages

Basic rule

The elements offered optionally for SML are not used by the MUC Controller unless they are specifically requested (see below). When SML messages are received by the MUC Controller that contain elements not supported by the MUC Controllers, then these SML messages will be answered by the MUC Controller with negative attention.

SML options used for SML_PublicOpen

The behavior offered optionally by SML in the sense of a wild card on the ‘serverID’ of the SML open messages is supported by the ZDUE-MUC.

The ZDUE-MUC supports the SML “password” option for SML open messages; the password, however, is not evaluated.

The optional ‘refTime’ element is supported by the ZDUE-MUC.

SML options used for the SML_ProfileList

The optional “serverID”, “username”, “password”, “begTime”, “endTime” and “objList” elements are evaluated and used by the ZDUE-MUC.

SML options used for SML_GetProcPar

The optional “serverID”, “username”, “password”, “parameterValue” and “child_List” elements are evaluated and used by the ZDUE-MUC.

SML options used for SML_SetProcPar

The optional “serverID”, “username” and “password” elements are evaluated and used by the ZDUE-MUC.

SML options used for SML_GetList

The optional “serverID”, “username” and “password”, “listName”, “actSensorTime”, “actGatewayTime” and “listSignature” elements are evaluated and used by the ZDUE-MUC.

Byte number of special SML attributes

The maximum number of bytes in the byte chain accepted by the ZDUE-MUC for the special SML attributes are defined as follows:

- ‘transactionId’ attribute: uses a max. of 64 bytes;

- ‘reqFileId’ attribute: uses a max. of 64 bytes;

- ‘username’ attribute: uses a max. of 64 bytes.

- ‘password’ attribute: uses a max. of 64 bytes.

Size of SML order messages

The maximum size of SML order messages addressed to the ZDUE-MUC itself is limited to 1400 bytes.

When forwarding SML order messages, the ZDUE-MUC does not check the size of the SML order messages and forwards them with no changes made.

SML transmission via TCP / UDP

The rules described in the section apply to the transmission of SML/SML-TP directly via TCP or UDP.

The ZDUE-MUC works on the customer/service interface as a server. If no data is transmitted via the interface for several minutes, the ZDUE-MUC will once again terminate the client/server connection.

The ZDUE-MUC uses the TCP-Port 7259 and the UDP-Port 7259 to transmit SML, if no SSL is used.

For SSL connections, the ZDUE-MUC uses TCP-Port 7260 to transmit SML.

SML transport protocol

Version

SML transport protocol Version 1 is used.

Interfaces

With the exception of the wireless MBus interface, the SML transport protocol is used on all of the ZDUE-MUC interfaces.

Dealing with checksums

If an SML file is received by a MUC Controller, the checksum contained in it will not be evaluated for the SML transport protocol.

If an SML file is created by a MUC Controller, the checksum contained in it for the SML transport protocol will be created correctly.

21.2 Parameters for general MUC functions

Explanation:	SML message types:
See Chapter 9, 13	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Period to record the entries in the operation logbook If '0' is entered here, the recording will be disabled. Enter '-1' to delete the operation logbook.	81 81 27 32 07 01	Integer16	Not available
2	Seconds index	00 00 60 08 00 FF	SML_Time	Not available
3	Status word (write to reset selected status bits)	81 00 60 05 00 00	Unsigned64	Not available
4	Interface name; (Number and content depend on number and type of interfaces in the MUC Controller).	81 KK 00 00 01 00 Column KK ⇔ 03 Column KK ⇔ 04 Column KK ⇔ 01	Octet String	Not available
5	Current UTC time	01 00 00 09 0B 00	SML_Time	Not available
6	Offset to actual time zone in minutes. Range: -720 to +720	81 00 00 09 0B 01	Integer16	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.3 Data structure to request the attributes of the WAN interface

Explanation:	SML message types:
See Chapter 13.3	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element of the tree to request current attributes of the WAN interface	81 04 00 06 00 FF	Not available	Entries for Items 2-3
2	Child element in the tree Current interface name / type, coded as ASCII string, to wide-area adapter used	81 04 00 00 01 00	Octet String	Not available
3	Child element in the tree Firmware version, coded as ASCII string, to wide-area adapter used	81 04 00 02 00 00	Octet String	Not available

Reading the elements depends on the access rights of the user. Writing the elements is not possible.

21.4 Data structure to read/set the WAN parameters

Explanation:	SML message types:
See Chapter 13.3	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element of the tree to read/write adjustable attributes of the WAN interface	81 04 00 07 00 FF	Not available	Entries for Items 2-4
2	Child element in the tree Automatic reboot: Period, indicated in seconds, after which the modem / WAN adapter in the MUC Controller is to be re-initialized. If '0', the automatic reboot is inactive.	81 04 27 32 03 01	Unsigned32	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.5 Data structure to read/set the GSM parameters

Explanation:	SML message types:
See Chapter 8.2	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to read/set the GSM parameters	81 04 02 07 00 FF	Not available	Entries for Items 2-8
2	Child element in the tree PIN for access to the SIM card	81 04 00 32 01 01	Octet String	Not available
3	Child element in the tree Determining operating mode to select the provider. 0: Automatic (SIM) 1: User list 2: First user list, then automatic (SIM)	81 04 00 32 04 01	Unsigned8	Not available
4	Child element in the tree GSM Bearer Service Type	81 04 00 32 08 01	Unsigned8	Not available
5	Child element in the tree GSM Quality of Service	81 04 00 32 09 01	Unsigned8	Not available
6	Child element in the tree Maximum duration of a GSM connection, indicated in seconds If '0', the function is set to inactive.	81 04 27 32 01 01	Unsigned16	Not available

Item	Feature / Property	Identifier	Type	List elements
7	Child element in the tree Idle time for a GSM connection, indicated in seconds. If '0', the function is set to inactive.	81 04 27 32 02 01	Unsigned16	Not available
8	Child element in the tree Number of rings until the call is answered. Number range 0..10. If '0', call answer is switched off.	81 04 31 32 01 01	Unsigned8	Not available

Being able to read and write the elements, except for Item 2, depends on the access rights of the user. Writing Item 2 depends on the access rights of the user.

21.6 Data structure to read / set the permissible GSM/GPRS providers

Explanation:	SML message types:
See Chapter 8.2	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the list of permissible GSM/GPRS providers	81 04 0D 06 00 FF	Not available	List acc. to OBIS-T with at least one entry according to Item 2.
2	Child element in the tree Permissible GSM/GPRS provider NN With NN = 01 … FE	81 04 0D 06 00 NN	Unsigned32	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.7 Data structure to read / set the provider-dependent GPRS parameters

Explanation:	SML message types:
See Chapter 8.3	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the provider-dependent GPRS parameters	81 04 0D 07 00 FF	Not available	NN entries for Item 2 and its child elements
2	Child element in the tree Contains the provider identifier NN to the APN With NN = 01…FE	81 04 0D 07 00 NN	Unsigned32	Entries for Items 3 to 9 in this table, if required

Item	Feature / Property	Identifier	Type	List elements
3	Child element in the tree PPP username	81 04 61 3C 01 FF	Octet String	Not available
4	Child element in the tree PPP password	81 04 61 3C 02 FF	Octet String	Not available
5	Child element in the tree Access Point Name (APN)	81 04 61 3C 03 FF	Octet String	Not available
6	Child element in the tree Primary DNS server	81 48 17 07 04 FF	Unsigned32 (IPv4)	Not available
7	Child element in the tree Secondary DNS server	81 48 17 07 05 FF	Unsigned32 (IPv4)	Not available
8	Child element in the tree Tertiary DNS server	81 48 17 07 06 FF	Unsigned32 (IPv4)	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.8 Data structure to request dynamic GPRS/GSM operating parameters

Explanation:	SML message types:
See Chapter 8.2 and 8.3	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the dynamically set, provider-dependent GPRS parameters	81 04 0D 08 00 FF	Not available	Entries for Items 2 to 14, if available
2	Child element in the tree Contains current provider identifier to the APN	81 04 0D 07 00 00	Unsigned32	Not available
3	Child element in the tree Contains current provider identifier of the network into which the MUC is logged	81 04 0D 06 00 00	Unsigned32	Not available
4	Child element in the tree Own IP address	81 48 17 07 00 00	Unsigned32 (IPv4)	Not available
5	Child element in the tree Current primary DNS server	81 48 17 07 04 00	Unsigned32 (IPv4)	Not available
6	Child element in the tree Current secondary DNS server	81 48 17 07 05 00	Unsigned32 (IPv4)	Not available
7	Child element in the tree Current tertiary DNS server	81 48 17 07 06 00	Unsigned32 (IPv4)	Not available

Item	Feature / Property	Identifier	Type	List elements
8	Child element in the tree Current cell identifier	81 04 1A 07 00 00	Unsigned 16	Not available
9	Child element in the tree Current Location / Area Code	81 04 17 07 00 00	Unsigned 16	Not available
10	Child element in the tree Current field strength (dBm)	81 04 2b 07 00 00	Integer 16	Not available
11	Child element in the tree IMSI	81 04 00 00 04 01	Octet String	Not available
12	Child element in the tree IMEI	81 04 00 00 03 00	Octet String	Not available
13	Child element in the tree SIM identifier (ICC-ID)	81 04 00 00 05 01	Octet String	Not available
14	Child element in the tree Own telephone number acc. to SIM card If the SIM card does not make this number available, an empty string will be delivered.	81 04 00 00 02 01	Octet String Own telephone number acc. to SIM card	Not available

Reading the elements depends on the access rights of the user. Writing the elements is not possible.

21.9 Data structure to read/set the LAN/DSL parameters

Explanation:	SML message types:
See Chapter 8.4	SetProcParameter; GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the LAN/DSL parameters	81 48 17 07 00 FF	Not available	Entries for Items 2 to 14, if available
2	Child element in the tree Computer name	81 48 00 00 00 00	Octet String	
3	Child element in the tree Primary DNS server	81 48 17 07 04 01	Unsigned32	
4	Child element in the tree Secondary DNS server	81 48 17 07 05 01	Unsigned32	
5	Child element in the tree Tertiary DNS server	81 48 17 07 06 01	Unsigned32	
6	Child element in the tree Own IP address	81 48 17 07 00 01	Unsigned32	
7	Child element in the tree Own subnet mask	81 48 17 07 01 01	Unsigned32	

Item	Feature / Property	Identifier	Type	List elements
8	Child element in the tree Own gateway IP	81 48 17 07 02 01	Unsigned32	
9	Child element in the tree DHCP True = on; False = off	81 48 00 32 02 01	Boolean	
10	Child element in the tree DSL mode True = DSL; False = LAN	81 48 00 32 03 01	Boolean	
11	Child element in the tree ICMP True = on; False = off	81 48 31 32 07 01	Boolean	
12	Child element in the tree PPPoE-user name	81 04 62 3C 01 01	Octet String	
13	Child element in the tree PPPoE password	81 04 62 3C 02 01	Octet String	
14	Child element in the tree PPPoE mode	81 04 62 3C 03 01	Unsigned8	

Being able to read and write the elements depends on the access rights of the user role.

21.10 Data structure to read the dynamically set LAN/DSL parameters

Explanation:	SML message types:
See Chapter 8.4	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the dynamically set LAN/DSL parameters	81 48 0D 06 00 FF	Not available	Entries for Items 2 to 7, if available
2	Child element in the tree Primary DNS server	81 48 17 07 04 00	Unsigned32	
3	Child element in the tree Secondary DNS server	81 48 17 07 05 00	Unsigned32	
4	Child element in the tree Tertiary DNS server	81 48 17 07 06 00	Unsigned32	
5	Child element in the tree Own IP address	81 48 17 07 00 00	Unsigned32	
6	Child element in the tree Own subnet mask	81 48 17 07 01 00	Unsigned32	
7	Child element in the tree Gateway IP address	81 48 17 07 02 00	Unsigned32	

Reading the elements depends on the access rights of the user. Writing the elements is not possible.

21.11 Data structure to request the IPT status

Explanation:	SML message types:
See Chapter 8.4	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to request the IPT status	81 49 0D 06 00 FF	Not available	Entries for the Items 2-4
2	Child element in the tree Target IP address for current IP telemetry master	81 49 17 07 00 00	Unsigned32 (IPv4)	Not available
3	Child element in the tree Target port address for current IP telemetry master	81 49 1A 07 00 00	Unsigned16	Not available
4	Child element in the tree Source port address for current IP telemetry master	81 49 19 07 00 00	Unsigned16	Not available

Reading the elements depends on the access rights of the user. Writing the elements is not possible.

21.12 Data structure to read/set the IPT parameters

Explanation:	SML message types:
See Chapter 8.4	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to read/set the IPT parameters	81 49 0D 07 00 FF	Not available	Entries for Items 2 and 8
2	Child element in the tree Root of primary IPT parameters	81 49 0D 07 00 01	Not available	Entries for Items 3-7
3	Child element in the tree Target IP address to primary IP telemetry master	81 49 17 07 00 01	Unsigned32 (IPv4)	Not available
4	Child element in the tree Target port address to primary IP telemetry master	81 49 1A 07 00 01	Unsigned16	Not available
5	Child element in the tree Source port address to primary IP telemetry master If ‘0’ is entered, any port can be freely selected.	81 49 19 07 00 01	Unsigned16	Not available
6	Child element in the tree Username to primary IP telemetry master	81 49 63 3C 01 01	Octet String	Not available

Item	Feature / Property	Identifier	Type	List elements
7	Child element in the tree Password to primary IP telemetry master	81 49 63 3C 02 01	Octet String	Not available
8	Child element in the tree Root of secondary IPT parameters	81 49 0D 07 00 02	Not available	Entries for Items 9-13
9	Child element in the tree Target IP address to secondary IP telemetry master	81 49 17 07 00 02	Unsigned32 (IPv4)	Not available
10	Child element in the tree Target IP address to secondary IP telemetry master	81 49 1A 07 00 02	Unsigned16	Not available
11	Child element in the tree Source port address to secondary IP telemetry master If '0' is entered, any port can be freely selected.	81 49 19 07 00 02	Unsigned16	Not available
12	Child element in the tree Username to secondary IP telemetry master	81 49 63 3C 01 02	Octet String	Not available
13	Child element in the tree Password to secondary IP telemetry master	81 49 63 3C 02 02	Octet String	Not available
14	Child element in the tree Waiting time, indicated in minutes, after which the repetition is started in the event of defective TCP communication[3]	81 48 27 32 06 01	Unsigned8	Not available
15	Child element in the tree Number of repetitions of defective TCP communication attempts If '0', the repetition of defective TCP communication attempts will be switched off.	81 48 31 32 02 01	Unsigned32	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.13 Data structure to read / set the PLC parameters

Explanation:	SML message types:
See Chapter 8.6	SetProcParameter, GetProcParameter

Data structure used:

[3] Defective TCP communication means the loss of the TCP socket.

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the PLC parameters	81 04 18 07 00 FF	Not available	Entries for the Items 2 and 3
2	Child element in the tree Utility ID – Unique identifier of the network operators (EVU)	81 04 18 07 01 FF	Octet String	Not available
3	Child element in the tree PLC transmission power – transmission power setting 0 ⇔ Default setting 1 ⇔ Low power … 7 ⇔ High power	81 04 18 07 12 FF	Unsigned8	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.14 Data structure to request dynamic PLC operation parameters

Explanation:	SML message types:
See Chapter 8.6	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the PLC parameters	81 04 0E 06 00 FF	Not available	Entries for Item 2
2	Child element in the tree Device Serial Number (DSN) – Unique serial number of the PLC network node	81 04 0E 06 01 FF	Octet String	Not available
3	Child element in the tree Device Node ID Dynamic address allocated to the PLC network node	81 04 0E 06 02 FF	Octet String	
4	Child element in the tree Parent Node ID Node ID of the parent node or data concentrator connected	81 04 0E 06 03 FF	Octet String	
5	Child element in the tree Current Network ID Identifier of the current PLC network	81 04 0E 06 04 FF	Octet String	
6	Child element in the tree Signal quality	81 04 0E 06 05 FF	Integer16	

Being able to read the elements depends on the access rights of the user role.

21.15 Data structure to read / set the W-MBUS parameters

Explanation:	SML message types:
See Chapter 15	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the W-MBUS parameters	81 06 19 07 00 FF	Not available	Entries for the Items 2 to 7, if available
2	Child element in the tree Selection of the wireless protocol to be used at the wireless M-Bus interface. 0 ⇔ T-Mode 1 ⇔ S-Mode 2 ⇔ S/T-Automatic (alternating) All other values are reserved	81 06 19 07 01 FF	Unsigned8	Not available
3	Child element in the tree Time of continuous reception in S-Mode (this parameter is not required unless the “2 ⇔ S/T-Automatic” variant has been selected). Indicated in seconds. “0” is not permitted.	81 06 19 07 02 FF	Unsigned8	Not available
4	Child element in the tree Time of continuous reception in T-Mode (this parameter is not required unless the “2 ⇔ S/T-Automatic” variant has been selected). Indicated in seconds. “0” is not permitted.	81 06 19 07 03 FF	Unsigned8	Not available
3	Child element in the tree Automatic reboot: Period, indicated in seconds, after which the W-MBUS modem in the ZDUE-MUC is to be re-initialized. If ‘0’, the automatic reboot is inactive.	81 06 27 32 03 01	Unsigned32	Not available
5	Child element in the tree Transmission power Transmission power setting acc. to allocation list 0 ⇔ Default setting 1 ⇔ Low 2 ⇔ Medium 3 ⇔ High	81 06 19 07 04 FF	Unsigned8	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.16 Data structure to read the W-MBUS status

Explanation:	SML message types:
See Chapter 15	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transport the W-MBUS parameters	81 06 0F 06 00 FF	Not available	Entries for the Items 2 to 5, if available
2	Child element in the tree Manufacturer type designation, coded as ASCII string, to W-MBUS adapter used	81 06 00 00 01 00	Octet String	Not available
3	Child element in the tree Unique ID of the W-MBUS adapter. Coding acc. to EN 13757-3/4	81 06 00 00 03 00	Octet String	Not available
4	Child element in the tree Firmware version of the W-MBUS adapter	81 06 00 02 00 00	Octet String	Not available
5	Child element in the tree Version of the W-MBUS hardware used	81 06 00 02 03 FF	Octet String	Not available

Being able to read the elements depends on the access rights of the user role.

21.17 This data structure is used by the firmware of your ZDUE-MUC or by data structures to define push processes

List of possible push sources

Explanation:	SML message types:
See Chapter 17	SetProcParameter, GetProcParameter

Data structure used:

Item	Push source	Coding	Information on push source
1	Addressed profile This push source can only be used in combination with periodical push processes.	81 81 C7 8A 42 FF	Use ‘List elements’ to indicate the push source (see data structure to address a particular push source). The profile for the completed push interval is always selected as the range for the profile to be sent periodically.
2	Installation parameters This push source can only be used in combination with event-driven push processes.	81 81 C7 8A 43 FF	Use ‘List elements’ to indicate the installation parameters to be sent (see data structure to transport the installation parameters) The event is triggered one minute after the operation mode is in effect.

Item	Push source	Coding	Information on push source
3	List of visible sensors/actuators	81 81 C7 8A 44 FF	The visible sensors/actuators are communicated via 'List elements' (seeData structure with the list of visible sensors /) The event is triggered one minute after the operation mode is in effect. The event is triggered periodically. The event is also triggered when a change has been made in the list contents.
4	List of active sensors/actuators	81 81 C7 8A 45 FF	The active sensors/actuators are communicated via 'List elements' (seeData structure with the list of activated sensors / actuators) The event is triggered one minute after the operation mode is in effect. The event is triggered periodically. The event is also triggered when a change has been made in the list contents.

Being able to read and write the elements depends on the access rights of the user role.

Data structure to transport the push process attributes

Explanation:	SML message types:
See Chapter 17	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type	List elements
1	Root element in the tree to transport the attributes of push processes	81 81 C7 8A 01 FF	Not available	List acc. to OBIS-T with at least one entry corresponding to Item 2.
2	Child element of the tree to transport the attributes of the push processes Delivers the number of the push process Contains at least one and optionally several references to the attribute(s) to be transported With NN = 01 … 20	81 81 C7 8A 01 NN	Not available	If no list element is indicated, the push process should be deleted /or is not available. As soon as at least one list element is indicated, the push process is available or a new one will be created. The entries for the Items 3 to 7 are permissible as list elements
3	Child element in the tree. Contains information on the push interval. This information is entered in seconds.	81 81 C7 8A 02 FF	Unsigned32	Not available

Item	Feature / Property	Identifier	Type	List elements
4	Child element in the tree. Contains the information on push delay This information is entered in seconds.	81 81 C7 8A 03 FF	Unsigned32	Not available
5	Child element in the tree. Contains the source for the push process. Contents acc. to push source, see data structure to address a particular push source.	81 81 C7 8A 04 FF	Octet String	Possibly available, depending on the source. The source is indicated as an OBIS identifier.
6	Child element in the tree. Contains the target for the push process (push-target name acc. to IP telemetry)	81 47 17 07 00 FF	Octet String	Possibly available, depending on the source.
7	Child element in the tree. Contains the service for the push process Contents: See list of possible push services	81 49 00 00 10 FF	Octet String	Not available

Being able to read and write the elements depends on the access rights of the user role.

List of possible push services

Explanation:	SML message types:
See Chapter 17	SetProcParameter, GetProcParameter

Data structure used:

Item	Push service	Coding	Data type	Information on push target
1	SML as response without request via IP telemetry	81 81 C7 8A 21 FF	Octet String	The push target, see E DIN 43863-4, is used. Additional information is not necessary.

Being able to read and write the elements depends on the access rights of the user role.

Data structure to address a particular push source

Explanation:	SML message types:
See Chapter 17	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Child element in the tree to transport the address of a push source Contains the server ID to the push source	81 81 C7 8A 81 FF	Octet String	At least one or more entries acc. to Item 2 of this table
2	Child element in the tree to transport the identifiers (of the “channel”) of a push source Contains the list of identifiers of the (measurement) values to be delivered by the push source	81 81 C7 8A 82 FF	Not available	At least 1 list element acc. to Item 3
3	Child element in the tree to transport the identifiers (of the “channel”) of a push source Contains the identifiers of the (measurement) values to be delivered by the push source NN = 01..FE These identifiers are indicated acc. to OBIS (coding as a chain of 6 bytes)	81 81 C7 8A 82 NN	Octet String	Not available
4	Child element in the tree to transport the address of a push source Contains the OBIS identifiers for the push source	81 81 C7 8A 83 FF	Octet String	Not available

Being able to read and write the elements depends on the access rights of the user role.

Data structure to transport the installation parameters

Explanation:	SML message types:
See Chapter 17	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Child element in the tree to transport the installation parameter: IP address to the WAN	81 81 C7 82 81 FF	Unsigned32	Not available
2	Child element in the tree to transport the installation parameters: Module class	81 81 C7 82 02 FF	Octet String	Not available

Being able to read the elements depends on the access rights of the user role.

Depending on the operating environment, individual parameters in the parameters listed in the above in the list of detailed information on a push process can be used in addition to the installation parameters. Not all the detailed information will be used at the same time.

21.18 Data structure with the list of visible sensors / actuators

Explanation:	SML message types:

See Chapter 14	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transport the list of visible sensors / actuators	81 81 10 06 FF FF	Not available	List elements acc. to Item 2; Empty lists are permitted.
2	Child element of the tree Lists to describe visible components	1st list 81 81 10 06 01 FF 2nd list 81 81 10 06 02 FF … etc. 250th list 81 81 10 06 FA FF	Not available	List elements acc. to Item 3 Empty lists are permitted.
3	List elements to describe visible components	List elements on 1: 81 81 10 06 01 NN List elements on 2: 81 81 10 06 02 NN … etc. List elements on 32: 81 81 10 06 FA NN Range NN: 0x01 - 0xFE	Not available	Exactly one element each acc. to Item 4 to 7 in this table
4	Child element of the tree Server ID of the visible components	81 81 C7 82 04 FF	Octet String	Not available
5	Child element of the tree Module class	81 81 C7 82 02 FF	Octet String	Not available
6	Child element of the tree Time stamp of the last receive Status (when last received; if possible, indication in UTC. If no UTC, the seconds index is used)	For UTC: 01 00 00 09 0b 00 For seconds index 00 00 60 08 00 FF	SML_Time	Not available
7	Child element of the tree Parent server ID Parent server ID (only for root element 81 81 10 06 FF FF)	8181C78214FF	Octet String	Not available

Being able to read the elements depends on the access rights of the user role.

Being able to write the elements depends on the access rights of the user role.

Only when changes are made in the list will this be done using the following root elements:

- List of new visible devices: 81811016FFFF
- List of no longer visible devices: 81811026FFFF

21.19 Data structure with the list of activated sensors / actuators

Explanation:	SML message types:
See Chapter 14	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transport the list of active sensors / actuators	81 81 11 06 FF FF	Not available	List elements acc. to Item 2; Empty lists are permitted.
2	Child element of the tree Lists to describe active components	1st list 81 81 11 06 01 FF 2nd list 81 81 11 06 02 FF … etc. 250th list 81 81 11 06 FA FF	Not available	List elements acc. to Item 3 Empty lists are permitted.
3	List elements to describe active components	List elements on 1: 81 81 11 06 01 NN List elements on 2: 81 81 11 06 02 NN … etc. List elements on 32: 81 81 11 06 FA NN Range NN: 0x01 - 0xFE	Not available	Exactly one element each acc. to Item 4 to 7 in this table
4	Child element of the tree Server ID of the active components	81 81 C7 82 04 FF	Octet String	Not available
5	Child element of the tree Module class	81 81 C7 82 02 FF	Octet String	Not available
6	Child element of the tree Time stamp of the last receive Status (when last received; if possible, indication in UTC. If no UTC, the seconds index is used)	For UTC: 01 00 00 09 0b 00 For seconds index 00 00 60 08 00 FF	SML_Time	Not available
7	Child element of the tree Parent server ID (only for root element 81 81 11 06 FF FF)	8181C78214FF	Octet String	Not available

Being able to read the elements depends on the access rights of the user role.

Only when changes are made in the list will this be done using the following root elements:

- List of new activated devices: 81811116FFFF
- List of no longer activated devices: 81811126FFFF

21.20 Data structure to deactivate a sensor / actuators

Explanation:	SML message types:
See Chapter 14	SetProcParameter, GetProcParameter

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the command: 'Deactivate sensor / actuator' '	81 81 11 06 FC FF	Not available	At least one element acc. to Item 2
2	Child element of the tree List of the sensors to deactivate	81 81 11 06 FC NN	Not available	Exactly one element acc. to Item 3
3	Child element of the tree Server ID of the sensor to deactivate	81 81 C7 82 04 FF	Octet String	Not available

21.21 Data structure to add an active sensor / actuator

Explanation:	SML message types:
See Chapter 14	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the command: 'Add sensor / actuator'	81 81 11 06 FB FF	Not available	At least one element acc. to Item 2
2	Child element of the tree Server ID of the sensor to be activated	81 81 11 06 FB NN	Not available	Exactly one element acc. to Item 3
3	Child element of the tree Server ID of the sensor to be activated	81 81 C7 82 04 FF	Octet String	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.22 Data structure to remove / delete a sensor / actuator

Explanation:	SML message types:
See Chapter 14	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the command: 'Remove sensor / actuator'	81 81 11 06 FD FF	Not available	At least one element acc. to Item 2

Item	Feature / Property	Identifier	Type / Contents	List elements
2	Child element of the tree Server ID of the sensor to be removed	81 81 11 06 FD NN	Not available	Exactly one element acc. to Item 3
3	Child element of the tree Server ID of the sensor to be removed	81 81 C7 82 04 FF	Octet String	Not available

Being able to read and write the elements depends on the access rights of the user role.

21.23 Data structure on request to 'Execute reset'

Explanation:	SML message types:
See Chapter 18.6	SetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the command: 'Reset'	81 81 C7 83 82 01	Not available	Not available

The ZDUE-MUC responds to this write command with AttentionResponse. After that, the ZDUE-MUC will perform a reset.

21.24 Data structure to request / respond to device identification

Data structure to request the device identification (MUC-C)

Explanation:	SML message types:
See Chapter 7.5	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to request the device identification.	81 81 C7 82 01 FF	Not available	Not available

Data structure to respond to the device identification (MUC-C)

Explanation:	SML message types:
See Chapter 7.5	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to respond to the device identification	81 81 C7 82 01 FF	Not available	Exactly one element each acc. to Items 2 to 5, 10 and optionally 12 of this table
2	Child element in the tree. Contains information on the module class	81 81 C7 82 02 FF	Octet String	Not available
3	Child element in the tree. Contains information on the producer (FLAG code).	81 81 C7 82 03 FF	Octet String	Not available
4	Child element in the tree. Contains server identification (server ID)	81 81 C7 82 04 FF	Octet String	Not available
5	Child element in the tree. Contains the list of firmware sections with their version details	81 81 C7 82 06 FF	Not available	One or more elements acc. to Item 6 of this table
6	Child element in the tree. Contains the information on a firmware section	Firmware: 81 81 C7 82 07 NN File: 81 81 C7 82 0C NN Application: 81 81 C7 82 0D NN	Not available	One element acc. to Item 7 as well as after that one element of Item 8 in this table
7	Child element in the tree. Contains the producer-specific name on the firmware section	81 81 C7 82 08 FF	Octet String	Not available
8	Child element in the tree. Contains the producer-specific version number on the firmware section	81 81 00 02 00 00	Octet String	Not available
9	Child element in the tree. Contains the feature “active” to a firmware section Contents: True ⇔ Activated	81 81 C7 82 0E NN	Boolean	Not available
10	Child element in the tree. Contains the list of producer-specific descriptions on hardware features (lot, type, …)	81 81 C7 82 09 FF	Not available	One or more elements acc. to Item 10 in this table
11	Child element in the tree. Contains a producer-specific free text	81 81 C7 82 0A NN	Octet String	Not available

21.25 Data structures on firmware/file download

Data structure on firmware/file download (transmission)

Explanation:	SML message types:

See Chapter 18.4	SetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transport firmware/file Delivers information on authorization as well as the binary to be loaded Contains at least one and optionally more references to the binary/binaries to be loaded	Depending on file: Firmware: 81 81 C7 81 01 FF File: 81 81 C7 81 0C FF Application: 81 81 C7 81 0D FF PLC distributed firmware: 81 81 C7 81 0E FF	Not available	Elements Item 2 and Item 3 of this table followed by at least one or more elements acc. to Item 4 of this table
2	Child element in the tree. Contains the name of the binary to be loaded	81 81 00 02 00 02	Octet String	Not available
3	Child element in the tree. Number of the message, starting with 1	81 81 00 02 00 05	Unsigned32	Not available
4	Child element in the tree. Contains information on the authorization of the binary Refers to the child elements with the block number4 and the binary to be loaded	81 81 00 02 01 NN (NN begins with 01 for the first list element to form)	Octet String	Element 1: See Item 5 Element 2: See Item 6
5	Child element in the tree. Contains the block number to which the binary is addressed	81 81 00 02 02 FF	Unsigned32	Not available
6	Child element in the tree. Contains the binary to be loaded	81 81 00 02 03 FF	Octet String	Not available

Data structure to order ‘Activate firmware/file’

Explanation:	SML message types:
See Chapter 18.4	SetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements

[4] The block number is determined by the manufacturer/producer.

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the command: 'Activate firmware / file' Name of the section to be activated	Firmware: 81 81 C7 83 82 07 File: 81 81 C7 83 82 0C Application: 81 81 C7 83 82 0D PLC distributed firmware: 81 81 C7 83 82 0E	Optional: Octet String	Exactly one element acc. to Item 2 and 3 in this table
2	Child element in the tree. Contains the index of the binary to be activated/deactivated Contents: 0 ⇔ the last binary loaded, 1 ⇔ the second-last binary loaded 2 ⇔ the binary selected by name	81 81 C7 83 83 01	Unsigned8	Not available
3	Child element in the tree. Contains the action to be performed Contents: 0 ⇔ Remove, 1 ⇔ Activate, 2 ⇔ Deactivate, 3 ⇔ Distribute in PLC network, 4 ⇔ Activate in PLC network, All others are reserved	81 81 C7 83 83 03	Unsigned8	Not available
4	Child element in the tree. Contains the point in time when the action is to be executed If this element is missing, the action will be executed immediately	81 81 C7 83 83 04	SML_Time	Not available

Request/response with GET control structure to request the status of the firmware/file download

Explanation:	SML message types:
See Chapter 18.4	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the response	81 81 00 02 00 01	Not available	Exactly one child element each acc. to Item 2 to Item 4 in this table

Item	Feature / Property	Identifier	Type / Contents	List elements
2	1. Child element of the tree to transmit the command response: Firmware/file name	81 81 00 02 00 02	Octet String	Not available
3	2. Child element of the tree to transmit the command response: Number of all messages to transmit the binary	81 81 00 02 00 03	Unsigned32	Not available
4	3. Child element of the tree to transmit the command response: Number of last successfully transmitted message of the binary	81 81 00 02 00 04	Unsigned32	Not available

Request with SET control structure to start firmware file download

Explanation:	SML message types:
See Chapter 18.4	SetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit a command: Order to start a firmware/file download	81 81 00 02 00 01	Not available	Exactly one child element each acc. to Item 2 to 3 of this table
2	1. Child element of the tree to transmit a command; Firmware/file name	81 81 00 02 00 02	Octet String	Not available
3	2. Child element of the tree to transmit a command; Number of all messages to transmit the binary (block number)	81 81 00 02 00 03	Unsigned32	Not available
4	3. Child element of the tree to transmit a command; Number of last successfully transmitted message of the binary Always enter ‘0’ for SET	81 81 00 02 00 04	Unsigned32	Not available

Request with GET control structure on status query of PLC distributed firmware/file download

Explanation:	SML message types:
See Chapter 18.4	GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the response	81 81 00 03 00 01	Not available	Exactly one child element each acc. to Item 2 to Item 4 of this table
2	1. Child element of the tree to transmit the command response: PLC distributed firmware/file name	81 81 00 03 00 02	Type: Octet String Contents: Identifier	Not available
3	2. Child element of the tree to transmit the command response: Number of all messages to transmit the binary	81 81 00 03 00 03	Type: Unsigned32 Content: Number of messages	Not available
4	3. Child element of the tree to transmit the command response: Number of the last successfully transmitted message of the binary	81 81 00 03 00 04	Type: Unsigned32 Content: Number of messages	Not available

Request with SET control structure to start the PLC distribute firmware/file download

Explanation:	SML message types:
See Chapter 18.4	SetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the command: Request to start a PLC distributed firmware/file download	81 81 00 03 00 01	Not available	Exactly one child element each acc. to Item 2 to 3 in this table
2	1. Child element of the tree to transmit a command; PLC distributed firmware/file name	81 81 00 03 00 02	Type: Octet String Content: Identifier	Not available
3	2. Child element of the tree to transmit a command; Number of all messages to transmit the binary	81 81 00 03 00 03	Type: Unsigned32 Content: Block number	Not available
4	3. Child element of the tree to transmit a command; Number of last successfully transmitted message of the binary	81 81 00 03 00 04	Type: Unsigned32 Content: Always enter ‘0’ for SET	Not available

21.26 Data structure to exchange a date/time mark

Data structure to request time information

Explanation:	SML message types:
See Chapter 9	SetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to request time information.	81 81 C7 88 10 FF	Not available	Not available

Data structure with response to time information

Explanation:	SML message types:
See Chapter 9	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree with the time information.	81 81 C7 88 10 FF	Not available	Exactly one element each acc. to Items 2 to 5 in this table.
2	Child element in the tree. Current UTC time	01 00 00 09 0B 00	SML_Time	Not available
3	Child element in the tree. Current second index	00 00 60 08 00 FF	SML_Time	Not available
4	Child element in the tree. Offset to current time zone in minutes Range: -720 to +720	81 00 00 09 0B 01	Integer16	Not available

21.27 Data structure with response / to set the NTP parameters

Data structure to request NTP parameters

Explanation:	SML message types:
See Chapter 9	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to request NTP parameters	81 81 C7 88 01 FF	Not available	Not available

Data structure with response / to set NTP parameters

Explanation:	SML message types:
See Chapter 9	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree with the NTP parameters.	81 81 C7 88 01 FF	Not available	At least one element each acc. to Items 2, 4 and 7 of this table and optionally elements 5 and 6
2	Child element in the tree. Contains the list of the IP addresses for the NTP servers	81 81 C7 88 02 FF	Not available	At least 1 element acc. to Item 3 in this table
3	Child element in the tree. Contains the IP address of the NTP server NN = 01…03	81 81 C7 88 02 NN	Octet String	Not available
4	Child element in the tree. Contains the port number of the NTP service	81 81 C7 88 03 FF	Unsigned16	Not available
5	Child element in the tree. Contains the period to send the synchronization token. This period (in seconds) is determined with the accuracy of the second index.	81 81 C7 88 04 FF	Unsigned32	Not available

Item	Feature / Property	Identifier	Type / Contents	List elements
6	Child element in the tree. Contains the offset (in seconds) to the dispatch of the synchronization signal to synchronize the sensors/ actuators connected based on 00:00:00. This offset is used once when operation mode is reached; all other outputs of the synchronization signal are performed with the previously named period.	81 81 C7 88 05 FF	Unsigned32	Not available
7	Child element in the tree. Activates/deactivates access to an NTP server	81 81 C7 88 06 FF	Boolean	Not available

21.28 Data structure of the attributes of a data mirror

Explanation:	SML message types:
See Chapter 16	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree with the attributes of a data mirror	81 81 C7 86 00 FF	Not available	One element each for the Items 2 to 12
2	Child element in the tree. Contains the server identification to the data source for the data mirror	81 81 C7 82 04 FF	Octet String	Not available
3	Child element in the tree. Contains the information on the module class	81 81 C7 82 02 FF	Octet String	Not available
4	Child element in the tree. Contains information on the producer (FLAG code).	81 81 C7 82 03 FF	Octet String	Not available
5	Child element in the tree Contains the last status information received (status word).	81 00 60 05 00 00	Octet String	Not available
6	Child element in the tree Contains the bit mask to define the bits of the status word; if changed, this will result in an entry on the data mirror in the operation logbook	81 81 C7 86 01 FF	Octet String	Not available
7	Child element in the tree Average time (ms) between two datasets received	81 81 C7 86 02 FF	Unsigned32	Not available

Item	Feature / Property	Identifier	Type / Contents	List elements
8	Child element in the tree Time stamp of the ZDUE-MUC controller, formed on reception of the last dataset	For UTC: 01 00 00 09 0b 00 For second index 00 00 60 08 00 FF	SML_Time	Not available
9	Child element in the tree. Contains the public key	81 81 C7 82 05 FF	Octet String	Not available
10	Child element in the tree. Contains the AES key to the wireless-MBus	81 81 C7 86 03 FF	Octet String	Not available
11	Child element in the tree. Contains the username for access to the sensor / actuator	81 81 61 3C 01 FF	Octet String	Not available
12	Child element in the tree. Contains the password for access to the sensor / actuator	81 81 61 3C 02 FF	Octet String	Not available

21.29 Data structure to set / read the attributes of a data collector

Explanation:	SML message types:
See Chapter 16	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree with the attributes of the data collector	81 81 C7 86 20 FF	Not available	One element each for Items 2 to 6
2	Child element in the tree Attributes of the data collector (NN ⇔ data collector number)	81 81 C7 86 20 NN	Not available	One element each for Items 2 to 7
3	Child element in the tree Feature ‘recording active / switched off’, TRUE ⇔ active	81 81 C7 86 21 FF	Boolean	Not available
4	Child element in the tree Number of register periods (when exceeded the oldest will be overwritten)	81 81 C7 86 22 FF	Unsigned16	Not available
5	Child element in the tree Register period, indicated in seconds (if 0, recording will be event-driven)	81 81 C7 87 81 FF	Unsigned32	Not available
6	Child element in the tree OBIS identifier to address the data collector	81 81 C7 8A 83 FF	Octet String	Not available
7	Child element in the tree List with values marked to be recorded via OBIS	81 81 C7 8A 23 FF	Not available	One or more elements acc. to Item 8 in this table

Item	Feature / Property	Identifier	Type / Contents	List elements
8	Child element in the tree List elements with values marked to be recorded via OBIS	81 81 C7 8A 23 NN	Octet String	

If the recording of the data is event-driven, the “OBIS identifier to address the data collector” element determines the event that will be reacted to.

21.30 List of predefined identifiers for data collector identification

Explanation:	SML message types:
See Chapter 16	-

Data structure used:

Identifiers acc. to OBIS are used for the identification of the data collectors. To provide for uniform use, the following allocation is required:

Item	OBIS identifier	Meaning
1	81 81 C7 86 10 FF	Standard load profile with register periods and meter readings by the minute (recorded at the full minute)
2	81 81 C7 86 11 FF	Standard load profile with ¼ h register periods and meter readings (recorded at the full ¼ hour)
3	81 81 C7 86 12 FF	Standard load profile with 1 h register periods and meter readings (recorded at the full hour)
4	81 81 C7 86 13 FF	Standard load profile with 24 h register periods and meter readings (recorded at day change)
5	81 81 C7 86 14 FF	Event memory with the meter readings / events of the last 2 hours
6	81 81 C7 86 15 FF	Event memory with weekly recorded meter readings/events (recorded at day change from Sunday to Monday)
7	81 81 C7 86 16 FF	Event memory with monthly recorded meter readings/events (recorded at change of month)
8	81 81 C7 86 17 FF	Event memory with annually recorded meter readings/events (recorded at change of year)
9	81 81 C7 86 18 FF	Event memory with installation meter reading of the meter connected
10	81 81 C7 86 18 NN	Event memory with freely running RP and recorded meter readings/events Value range for NN: 0x01 to 0x0A

21.31 Data structure to clear a data collector

Explanation:	SML message types:
See Chapter 16	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to transmit the command: Clear data collector	81 81 C7 83 82 05	Not available	One element each acc. to Item 2 and 3 in this table
2	Child element in the tree. Server ID to the data mirror whose data collector is to be emptied	81 81 C7 82 04 FF	Octet String	Not available

Item	Feature / Property	Identifier	Type / Contents	List elements
3	Child element in the tree. Identifier of the data collector to be emptied	81 81 C7 8A 83 FF	Type: Octet String	Not available

21.32 Access to data collectors

Explanation:	SML message types:
See Chapter 16	SML_ProfileList

Access to the data collectors is available with the use of the server ID of the allocated sensor/actuator.

The data collectors can only be accessed via SML_ProfileList.

As ‘valTime’ (see ‘SML_GetProfileList.Res’) the second index of the ZDUE-MUC is used at the time of recording the dataset in the load profile collector.

In addition, there is a column under the OBIS identifier 01 00 00 09 0B 00 in the load profile in which the UTC time of the MUC is supplemented.

If available, the time information delivered by the sensor (if available, see ‘actSensorTime’ in the ‘SML_GetList.Res’) is entered in another column under the OBIS identifier 81 00 00 09 0B 00.

21.33 Data structure to determine access rights for the roles

Explanation:	SML message types:
See Chapter 10.	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element in the tree to set the user rights / roles	81 81 81 60 FF FF	Not available	One or more entries in Item 2 of this table
2	Child element in the tree Role	81 81 81 60 NN FF NN determines the role; range: 0x01 - 0x08	Not available	One or more entries in Item 3 of this table
3	Child element in the tree Access right	81 81 81 60 NN ZZ NN determines the role; range: 0x01 - 0x08 ZZ determines the access right, range: 0x01 – 0xFE	Not available	Entries for the Items 4-7 of this table, whereby Item 6 is optional
4	Child element in the tree Username for access	81 81 81 61 FF FF	Octet String	Not available

Item	Feature / Property	Identifier	Type / Contents	List elements
5	Child element in the tree Password for access (See Determination of the user concept: Reading the attribute is only permissible insofar as the value read is encrypted. Plain text is to be used for writing access.)	81 81 81 62 FF FF	Octet String	Not available
6	Child element in the tree Public key for authentication for access to this instance; this information is not necessary if access without signature protection is allowed	81 81 81 63 FF FF	Octet String	Not available
7	Child element in the tree List of access rights per server identifier	81 81 81 64 01 SS First server ID group: SS determines the server identifier, range: 0x01 – 0xFE	Octet String	One or more entries acc. to Item 8 in this table
8	Child element in the tree OBIS identifier of the instance for which the access right is to be issued Bit 0 ⇔ Read Bit 1 ⇔ Write Bit 2 ⇔ Execute All other bits are to be set to ‘0’	< OBIS identifier of the instance > If the root element or the OBIS identifier to a branch is entered here, the rights will apply to all elements of the branch, unless other information has been entered for an element / branch lower down.	Unsigned8 .	Not available

To read Item 8, Item 7 must be accessed directly.

21.34 Data structure to read/set the attributes of Interface I3

Explanation:	SML message types:
See Chapter 16	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element of the data structure to read/set the attributes of the interface to the final customer	81 02 00 07 00 FF	Not available	Entries for the Items 2-10
2	Child element in the tree. Pulling the own IP address 0 ⇔ Manual selection 1 ⇔ DHCP client 2 ⇔ Zero config All other values are reserved.	81 02 00 07 01 FF	Unsigned8	Not available
3	Child element in the tree. Own, manually set IP address	81 02 17 07 00 01	Unsigned32 (IPv4)	Not available
4	Child element in the tree. Own network mask	81 02 17 07 01 01	Unsigned32 (IPv4)	Not available
5	Child element in the tree. Activate/deactivate DHCP server TRUE ⇔ DHCP server activated	81 02 00 07 02 FF	Boolean	Not available
6	Child element in the tree. DHCP server, local network mask	81 02 00 07 02 01	Unsigned32 (IPv4)	Not available
7	Child element in the tree. DHCP server, Default gateway	81 02 00 07 02 02	Unsigned32 (IPv4)	Not available
8	Child element in the tree. DHCP server, DNS Server	81 02 00 07 02 03	Unsigned32 (IPv4)	Not available
9	Child element in the tree. DHCP server, Start address of the dynamic IP address pool	81 02 00 07 02 04	Unsigned32 (IPv4)	Not available
10	Child element in the tree. DHCP server, End address of the dynamic IP address pool	81 02 00 07 02 05	Unsigned32 (IPv4)	Not available

21.35 Data structure to read the dynamic attributes of Interface I3

Explanation:	SML message types:
See Chapter 16	SetProcParameter, GetProcParameter

Data structure used:

Item	Feature / Property	Identifier	Type / Contents	List elements
1	Root element of the data structure to read the status of the interface to the final customer	81 02 00 07 10 FF	Not available	Exactly one entry at Item 2
2	Child element in the tree. Current own IP address	81 02 17 07 00 00	Unsigned32 (IPv4)	Not available

21.36 Data structures for the operation logbook

See Chapter 18.5

The operation logbook is transported via the SML message “GetProfileListResponse”.

Coding of events in the operation logbook:

The coding of events in the operation logbook is specified in the FNN-MUC specs.

Example:

Coded event	Bits 31-24 Source	Bits 23-20 Level	Bits 19-8 Reversed	Bits 7-0 Event no.
0x4280000B	0x42	0x8	0x000	0x0B
0x00800000	0x00	0x8	0x000	0x00

Entries:

Item	Coding	Event	Comment
1	0x00800000	Timer	Periodical logbook entry
2	0x00100001	Power failure	The event is entered as the first entry in the operation logbook after the power supply has been reconnected
3	0x00100023	Return of power supply	
4	0x00100003	Firmware activation	The event is the first entry made in the operation logbook after the successful activation of the firmware loaded
5	0x00100004	Defective firmware	
6	0x00100005	Firmware hash error	
7	0x00100006	Firmware type error	
8	0x00100007	Firmware upload OK	
9	0x00800004	Periodic reset	Periodic reset of a communications module
10	0x00800005	Watchdog	Watchdog occurred
11	0x00800006	Sync-token created	Reserved for later applications
12	0x00800007	Sync-token forwarded	Reserved for later applications

Item	Coding	Event	Comment
13	0x00800008	Push process successful	
14	0x00800009	Push process not successful	
15	0x01100008	Extension interface ready	Reserved for later applications
16	0x01100009	Extension interface defective	Reserved for later applications
17	0x02100008	Customer interface ready	
18	0x02100009	Customer interface defective	
19	0x04100001	WAN module ON	
20	0x04100002	WAN module OFF	
21	0x04100008	WAN available	Wide-area network recognized
22	0x04100009	WAN not available	Wide-area network not recognized
23	0x0410000A	Logged into WAN	Logged into wide-area network
24	0x0410000B	Logged out of WAN	Logged out of wide-area network
25	0x0410000C	Cut off from WAN	Cut off from wide-area network
26	0x0440000A	CSD-Connect	CSD connection established
27	0x0440000B	CSD-Disconnect (MUC)	CSD connection disconnected by the MUC
28	0x0440000C	CSD-Disconnect (other party)	CSD connection disconnected by other party
29	0x4140000A	Local IP access made	Customer/extension interface
30	0x4140000B	Local IP access ended	Customer/extension interface
31	0x4140000C	Local IP access cut off	Customer/extension interface
32	0x4140000D	Local IP access refused	Customer/extension interface
33	0x4140000E	Local IP access lost	Customer/extension interface
34	0x4840000A	WAN service access made	ZDUE-GPRS-MUC: GPRS IP access ZDUE-DC-MUC: GPRS IP access ZDUE-PLC-MUC: PLC access
35	0x4840000C	WAN service access cut off	
36	0x4840000B	WAN service access ended	
37	0x4840000D	WAN service access refused	
38	0x4840000E	WAN service access lost	
39	0x4970000A	IPT access made	
40	0x4970000D	IPT access refused	IPT Master connection refused
41	0x4970000C	IPT access cut off	IPT Master connection cut off
42	0x4970000B	IPT access ended	ZDUE-MUC connection ended
43	0x4970000E	IPT access lost	Connection unexpectedly ended
44	0x4A70000A	NTP access made	Connection to service is established (NTP)
45	0x4A70000D	NTP access refused	Connection to service is refused (NTP)
46	0x4A70000C	NTP access cut off	Connection to service ended by provider (NTP)
47	0x4A70000B	NTP access ended	Connection to service ended by ZDUE-MUC (NTP)
48	0x4A70000E	NTP access lost	Connection to service unexpectedly ended (NTP)
49	0x4280000A	Connection made	Begin of SML data traffic
50	0x4280000B	Connection ended	End of SML data traffic

Sources for entries in the operation logbook

Item	Coding	Source (peer address)
1	8101000000FF	ETH (extension interface)
2	8102000000FF	ETH (customer interface)
3	8103000000FF	RS232 (service interface)
4	8104000000FF	ETH (WAN interface)
5	8105000000FF	eHZ interface
6	8106000000FF	W-MBus interface
7	8141000000FF	IP (extension interface)
8	814200000001	SML (extension interface)
9	814200000002	SML (customer interface)
10	814200000003	SML (service interface)
11	814200000004	SML (WAN interface)
12	814200000005	SML (eHZ interface)
13	814200000006	SML (W-MBUS interface)
14	8145000000FF	Push (SML)
15	8146000000FF	Push (IPT source)
16	8147000000FF	Push (IPT drain)
17	814800000001	WAN (DHCP)
18	814800000002	WAN (IP)
19	814800000003	WAN (PPPoE)
20	814900000001	WAN (IPT-Cntrl)
21	814900000002	WAN (IPT)
22	814A000000FF	WAN (NTP)
23	818100000001	Operation logbook (cyclical entries)
24	818100000002	SCM (internal MUC SW function)
25	818100000003	UPDATE (internal MUC SW function)
26	818100000004	SMLC (internal MUC SW function)
27	818100000005	OHDL_MUCCFG (internal MUC SW function)
28	818100000006	OHDL_SMLDL (internal MUC SW function)
29	818100000007	AUTHC (internal MUC SW function)
30	818100000008	BSZ (internal MUC SW function)
31	818100000009	DATACOLL (internal MUC SW function)
32	81810000000A	SHDL (internal MUC SW function)
33	81810000000B	GPRS (internal MUC SW function)
34	81810000000C	LEDIO (internal MUC SW function)
35	81810000000D	LISTC (internal MUC SW function)
36	81810000000E	SYNC_MUC (internal MUC SW function)
37	81810000000F	SYNC_MUCDC (internal MUC SW function)
38	818100000010	EHZIF (internal MUC SW function)
39	818100000011	USERIF (internal MUC SW function)
40	818100000012	WMBUS (internal MUC SW function)
41	818100000013	WANGSM (internal MUC SW function)
42	818100000014	WANPLC (internal MUC SW function)

21.37 Read out data collectors

The GetProfileListRequest SML command is used to read out the data collectors. The response comes in a GetProfileListResponse message.

The GetProfileListRequest is to be sent to the server ID of the meter to be read.

21.38 Read out current dataset

The GetListRequest SML command is used to read out the current dataset. The response comes in the GetListResponse message.

The GetListRequest is to be sent to the server ID of the meter to be read.

21.39 Data structures on the device logbook

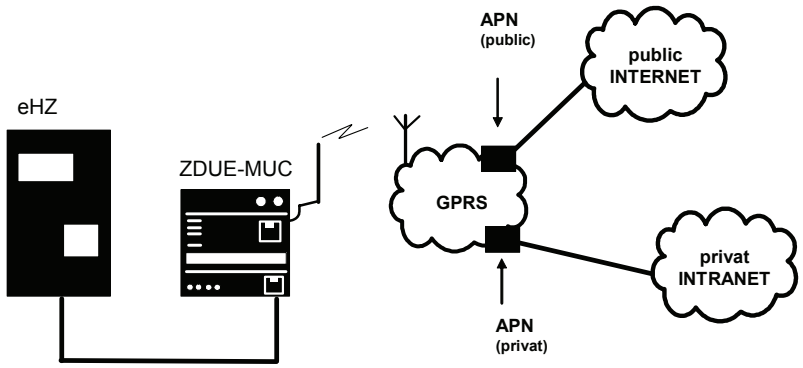
See Chapter 19.4

The device logbook is transported by the “GetProfileListResponse” SML message.

22 Glossary

APN (Access Point Name)

Cross-network connections, e.g. from the GPRS network into the internet, are established in the GPRS network by so-called APNs.



A terminal device that wants to establish a connection via the GPRS network provides the APN to indicate with which network it wants to be connected: the internet or a private company network that is connected via a leased line.

The APN indicates the point at which access is provided to the other network. It is given to the user by the network operator.

Auto Cross-Over

LAN components are connected to each other with Ethernet cables. The plugs on these cables are wired either one-to-one (patch cable) or crossed over (cross-over cable). If a LAN component supports auto crossover, the component automatically recognizes whether it is a crossover cable or a patch cable and reacts accordingly. Both types of cable can be used without manual intervention.

Client / Server

In a client-server environment, a server is a program or a computer that accepts and responds to requests from the client program or client computer.

In data communication, the computer that establishes a connection to a server (or host) is also called the client; i.e. the client is the computer calling, the server (or host) is the computer called.

CSD 9600

CSD (9600) stands for Circuit Switched Data or data dial-up. A connection is established between two subscribers (end points in the connection), similar to a telephone call in the public telephone network. Subscriber 1 dials the calling number of subscriber 2. The network signals the incoming call to subscriber 2, subscriber 2 accepts the call and the network establishes the connection until one of the subscribers ends the connection.

In the GSM network, this service is called CSD and enables data transmission with 9600 bps or 14400 bps, whereby the transmission can be secure or not secure. Connections can be made from a GSM modem to another GSM modem, from an analog modem to a GSM modem and from an ISDN modem to a GSM modem.

Datagram

In the TCP/IP transmission protocol, data is sent in the form of data packets, so-called datagrams. An IP datagram has the following structure:

1. IP header

2. TCP/UDP header

3. Data (payload)

The IP header contains:

- the IP address of the sender (source IP address)
- the IP address of the recipient (destination IP address)
- the protocol number of the protocol of the next higher protocol layer (acc. to the OSI layer model)
- the IP header checksum to check the integrity of the header on receipt

The TCP/UDP header contains the following information:

- Port of the sender (source port)
- Port of the recipient (destination port)
- a checksum for the TCP header and some information from the IP header (e.g. source and destination IP address)

DHCP

Dynamic Host Configuration Protocol (DHCP) takes care of the automatic dynamic allocation of IP addresses and other parameters in a network. The Dynamic Host Configuration Protocol uses UDP. It was defined in the RFC 2131 and was allocated the UDP ports 67 and 68. DHCP operates in client-server mode, whereby the server allocates the IP addresses to the client.

DNS

Addressing in IP network is done using IP addresses. As a rule, this address is indicated as a domain address (i.e. in the format of www.abc.xyz.de). If the addressing is done via the domain address, the sender first sends the domain address to a domain name server (DNS) and receives the corresponding IP address. Then the sender can address its data to this IP address.

FLAG code

The FLAG code is an international, three-letter code for device manufacturers that is unique to each manufacturer. The FLAG code is required by different international standards in metering. The FLAG code is issued by the FLAG Association Limited, which has its headquarters in London. A list of the FLAG codes already issued and the registered manufacturers can be found at http://www.dlms.com.

The FLAG code for Dr. Neuhaus Telekommunikation GmbH is: DNT.

GPRS

GPRS is the abbreviation of "General Packet Radio Service" and is the data transmission system used by GSM2+ mobile communication systems. GPRS systems use the base stations of the GSM networks for radio technology and have their own infrastructure to link and connect to such other IP networks as the internet, for example. Data is sent in packets, whereby the internet protocol (IP) is used. GPRS allows data rates of up to 115.2 KBps.

GSM

GSM (= Global System for Mobile Communication) is an international standard for digital mobile communication networks. In addition to voice service for telephony, GSM also supports such different data services as fax, text messages (SMS), CSD and GPRS. Depending on the legal regulations in the different countries, the following frequency bands are used: 900 MHz, 1800 MHz or 850 MHz and 1900 MHz.

IARP

IARP (Inverse Address Resolution Protocol) is used to determine the IP address of the owner of a known MAC address in an Ethernet IP network.
Subscriber A knows the MAC address of subscriber B.
However, in order to establish a TCP/IP connection to subscriber B, subscriber A needs the IP address of subscriber B.
To get subscriber B’s IP address, subscriber A sends an IARP request to subscriber B’s MAC address. Subscriber B responds with the corresponding IP address.

Intranet

An intranet is a private IP network and can be different sizes. The IP network of a company, for example, is an intranet, or several private computers that are linked with one another.

In contrast, the internet is a public network. Intranet and Internet should only be linked using protective programs, such as a firewall.

IP Address

Every host or router on the internet / intranet has a unique IP address (IP = Internet Protocol). The IP address is 32 bits (= 4 bytes) long and is written as 4 groups of numbers (each in the range from 0 to 255), separated by a dot.

An IP address is made up of 2 parts: the network address and the host address.

All the hosts in a network share the same network address, but have different host addresses. Depending on the size of the network concerned – we distinguish between networks in the categories of Class A, B and C – the two parts of the address are different in size:

<table>
<tr><td></td><td>1st byte</td><td>2nd byte</td><td>3rd byte</td><td>4th byte</td></tr>
<tr><td>Class A</td><td>Network address</td><td colspan="3">Host address</td></tr>
<tr><td>Class B</td><td colspan="2">Network address</td><td colspan="2">Host address</td></tr>
<tr><td>Class C</td><td colspan="3">Network address</td><td>Host address</td></tr>
</table>

Whether an IP address designates a device in a network in the category of Class A, B or C can be seen by the first byte in the IP address. The rules are as follows:

	Value of the 1st byte	Bytes for the network address	Bytes for the host address
Class A	1-126	1	3
Class B	128-191	2	2
Class C	192-223	3	1

Technically speaking, there can only be a maximum of 126 Class A networks in the entire world, whereby each of these networks can accommodate a maximum of 256 x 256 x 256 hosts (3 bytes of address room). There can be a maximum of 64 x 256 Class B networks, which can contain up to 65,536 hosts (2 bytes of address room: 256 x 256). There can be up to 32 x 256 x 256 Class C networks, each of which can have up to 256 hosts (1 byte of address room).

IP packet

See datagram

IP telemetry

IP telemetry according to E DIN 43863-4 is a protocol used to transmit telemetry data via IP networks. It is optimized to add only very few control commands to the usage data and allows clients to operate using dynamically allocated IP addresses.

First, the IP telemetry client sets up a TCP/IP connection to the IP telemetry master. Then the IP telemetry client logs into the IP telemetry master by providing its username and password.

If the login is successful, usage data and control commands can be exchanged. All the data is encrypted. Control commands include an additional escape sequence, which differentiates them from usage data.

Location Area Code

A Location Area is a group of neighboring GSM base stations that are connected with one another to facilitate the search for and call signaling of a GSM device, such as the ZDUE-GPRS-MUC. The group can include anywhere from 10 to 100 GSM base stations. Each of these groups has an internationally unique code (Location Area Code = LAC)

Local bus

MUC modules in a MUC metering device use the local bus to communicate with one another. The local bus is an Ethernet network in which TCP/IP and UDP/IP are used as the communication protocols.

Other subscribers, such as further base modules can be added to the MUC metering device without having to switch the device off. It is not necessary to configure the MUC modules when connecting them to the local bus.

The IP addresses necessary for TCP/IP and UDP/IP are issued automatically. Once switched on, each MUC module first selects any IP address freely and checks to see whether another bus subscriber is already using that IP address. If the IP address is still available, the MUC module keeps it; if not, the MUC module selects a new IP address and checks again to see whether or not it is already being used. This process continues until a free IP address is found.

The local bus also supplies additional MUC modules, such as IW modules and communication modules, with power, using a process similar to Power-over-Ethernet.

MCC/MNC

The MCC (Mobile Country Code) and the MNC (Mobile Network Code) are internationally unique codes for a mobile communications network.

The MCC has three digits, the MNC two or three digits.

There are a number of different websites on the internet on which it is possible to find a list of the MCC/MNCs for the different countries and network operators.

Net mask/Subnet mask

As a rule, only one IP address is officially issued to a corporate network with access to the internet, e.g. 134.76.0.0. In this example, the 1st byte shows that this corporate network is a Class B network, i.e. the last 2 bytes can be used freely for the host address. This means that, technically speaking, the system can accommodate up to 65,536 possible hosts (256 x 256).

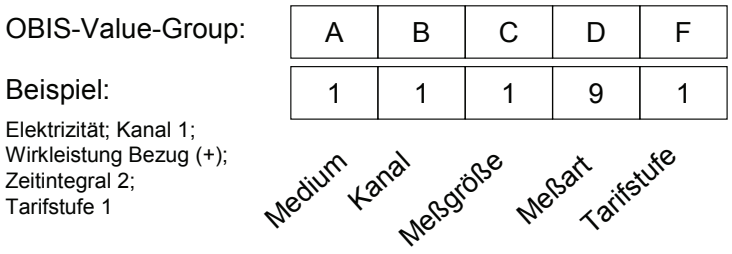
Such an enormous network does not make a lot of sense. In this case, it is necessary to form subnetworks, which is what the subnet mask is for. Like an IP address, it is a field 4 bytes long. A value of 255 each is allocated to the bytes that represent the network address. This serves primarily to “save” a part in the host address range to use to address subnets. In a Class B network, for example, (2 bytes for the network address, 2 bytes for the host address) with the help of the subnet mask 255.255.255.0, the 3rd byte, which was actually reserved for the host address, can now be used for the subnet address. Technically speaking, it is then possible to have 256 subnets with 256 hosts each.

NTP

NTP (Network Time Protocol) is an IP protocol with which the exact time is pulled from a time server via an IP network. The time servers are generally connected to time standard servers and supply the coordinated universal time (UTC) with very high accuracy. The Network Time Protocol uses special algorithms to calculate the delays on the transmission route on the basis of several sequential requests.

OBIS / OBIS-T

In the metering industry, the OBIS ("Object Identification System") identifiers serve to uniquely identify the metering values (energy quantities, meter reading) as well as abstract data in the electronic data exchange between the participating communication partners.



Medium: z.B. Elektrizität, Wasser, Gas, Wärme etc.
Kanal: Zumeist irrelevant; Default 1
Meßgröße: z.B. Wirkleistung Lieferung (-),
Meßart: z.B. Zählerstand, Maximum etc.
Tarifstufe: z.B. Total, Tarif 1, Tarif 2 etc.

OBIS identifiers are international standards and published in IEC 62056-61 for the medium of electrical energy.

Derived from the systematics of the OBIS identifiers, OBIS-T identifiers were introduced in the SyM² Project (www.sym2.org) for the first time, whereby T stands for telemetry. The OBIS-T identifiers uniquely identify the parameters that serve to configure and operate the devices used in the metering industry. The OBIS-T identifiers that can be used for a MUC Controller can be found in the FNN-MUC specifications.

Port number

The port-number field is 2 bytes in size in UDP and TCP headers. Allocating port numbers makes it possible to identify the different data streams that UDP/TCP process at the same time. These port numbers are used for the entire data exchange between UDP/TCP and the application processes. The port numbers are issued to the application processes dynamically and randomly. Fixed port numbers are issued to certain frequently used application processes. They are referred to as “assigned numbers”.

Power-over-Ethernet

Power-over-Ethernet is a technology that passes electrical power to the LAN components in addition to the data via the Ethernet cable, which connects the Ethernet LAN components with one another. It uses wires in the Ethernet cable that are not required for data transmission.

PPPoE

Acronym for Point-to-Point Protocol over Ethernet. Based on the PPP and Ethernet standards. PPPoE is a specification to connect users via Ethernet with the internet using a common medium, such as DSL, wireless LAN or a cable modem.

Protocol, transmission protocol

Devices that communicate with one another have to use the same rules. They have to “speak the same language”. These rules and standards are known as the protocol or the transmission protocol. Popular protocols include IP, TCP, PPP, HTTP or SMTP. TCP/IP is the generic term for all protocols based on IP.

Server ID

The server ID is the unique address of every MUC module. The server ID corresponds to the MAC address of the local bus of a MUC module.

For components without a local bus (e.g. MDE or control center), the server ID is formed in different ways, but is unique in any case.

Service provider

Provider, company, institution that gives users access to the internet or to an online service.

SML

SML (=Smart Message Language) is a communication protocol for applications in the field of data procurement and the parameterization of devices. For transmission, the usage data is packed into SML messages, which are compiled to form SML files, whereby the SML files are independent from the transmission mechanism. They can be sent via e-mail, modem connection or IP telemetry.

SML files can be SML request files, SML response files or SML combined files.

An SML message is either a request message or a response message. Depending on the job to be done, SML defines different types of messages.

The SML-Transport-Protocol (SML-T) is used to transmit SML messages via unsecured connections. This protocol is used on all interfaces for the MUC.

TCP/IP (Transmission Control Protocol/Internet Protocol

Network protocols used for the connection of two computers on the internet.

IP is the basic protocol.

UDP is based on IP and sends individual packets, which can arrive at the recipient in a different order than the one they were sent in or can even get lost on the way.

TCP is used to make the connection more secure and makes sure, for example, that the data packets are forwarded to the application in the correct sequence.

In addition to the IP addresses, UDP and TCP have port numbers between 1 and 65535, which are used to differentiate between the different services.

A number of other protocols are based on UDP and TCP, e.g. HTTP (Hyper Text Transfer Protocol), HTTPS (Secure Hyper Text Transfer Protocol), SMTP (Simple Mail Transfer Protocol), POP3 (Post Office Protocol, Version 3), DNS (Domain Name Service).

ICMP is based on IP and contains control messages.

SMTP is an e-mail protocol based on TCP.

IKE is an IPsec protocol based on UDP.

ESP is an IPsec protocol based on IP.

On a Windows PC, the WINSOCK.DLL (or WSOCK32.DLL) is used to process both protocols.

(→ Datagram)

UDP

See TCP/IP

UTC

UTC (Universal Time Coordinated) is the world time derived from atomic time. Nowadays, UTC is the time standard used in daily life. It is made public by time transmitters and other time services (e.g. NTP servers). UTC is based on the time in the time zone for the old Greenwich Mean Time (GMT). In Germany, the official time in the summer deviates from UTC by + 2 hours and by + 1 hour in the winter:

Daylight-savings time: UTC = 12:00 => Germany = 14:00

Winter time: UTC = 12:00 => Germany = 13:00

23 Specifications

23.1 ZDUE-GPRS-MUC

General information	Use	The ZDUE-GPRS-MUC is a meter-data-transmission device to request data from and monitor meters for electricity, gas and water by remote. It uses the GPRS service of the GSM mobile communications network to transmit the data.
Local interfaces	Customer/service interface I3	10/100 Base-T (RJ45 plug), Ethernet IEEE802, Auto-Cross-Over SML protocol via TCP/IP (Default-IP 192.168.1.229)
	eHZ interface	V.24 / V.28 with TX, RX, GND and auxiliary supply 9600 bps, 8 N 1 Auxiliary supply level acc. to V.28, minimal 25 mA SML protocol via serial interface
	Extension interface	Reserved for future applications
	Wireless M-Bus	868 MHz wireless interface Physical and link layer acc. to EN 13757-4 Application layer acc. to EN 13757-1, -3 or SML Impedance nominal: 50 ohms; jack: Fakra C, pluggable
Wide-area-network interface	Type	Quad-band GSM/GPRS wireless module EGSM 850, 900, 1800, 1900
	Output power	Class 4 (2W) for 850 / 900 MHz Class 1 (1W) for 1800 / 1900 MHz
	GPRS	Multislot Class 10 (3+2 & 4+1) DL up to 85.6 kbps, UL up to 42.8 kbps Coding scheme: CS1 to CS 4 Mobile Station Class B SML protocol via TCP/IP
	GSM	Circuit Switched Data (CSD) 9600 bps, non-transparent SML protocol via serial CSD connection
	GSM antenna connection	Impedance nominal: 50 ohms; jack: Fakra D, pluggable
Memory depth	Datasets	Size of data-mirror partition: approx. 12 MB Admin overhead per data collector: approx. 1200 bytes Size of an eHZ dataset: approx. 220 Byte
Time server	Accuracy	+/- 20 ppm at 25°C
	Power reserve	> 48h
	Synchronization	Per Network Time Protocol (NTP)

Environmental conditions	Temperature range	Operation: -10 °C to +55 °C Storage: -40 °C to +70 °C
	Humidity	0-95 %, non-condensing
Enclosure	Design	Top-hat rail enclosure
	Material	Plastic
	Protection rating	IP 20
	Dimensions	Approx. 70 x 60 x 90 mm (L x W x H);
	Weight	Approx. 180g
Power supply	Input voltage	207 V AC … 253 V AC
	Power consumption	Max. 7 watts for GSM/GPRS operation, highest transmission power, active data transfer Approx. 3 watts for GSM/GPRS operation, GPRS logged in, no data transfer
Conformity	CE	Yes
	EMV/ESD	Conforms to Guideline 2004/108/EG Standards used: EN 55022:2006 Class A, EN 55024: 1998 + A1:2001 + A2:2003, EN 61000-6-2:2001
	Electrical safety	Conforms to Guideline 2006/95/EG Standard used: EN 60950-1:11-2006 Protection rating 2 Overvoltage category II
	R&TTE	EN301419-1, EN301511
	Environment	The device meets the requirements of the ROHS and WEEE European Directives.

23.2 ZDUE-DSL-MUC

General information	Use	The ZDUE-DSL-MUC is a meter-data-transmission device to request data from and monitor meters for electricity, gas and water by remote. It uses an Ethernet-LAN or a DSL connection for data transmission.
Local interfaces	Customer/service interface I3	10/100 Base-T (RJ45 plug), Ethernet IEEE802, Auto-Cross-Over SML protocol via TCP/IP (Default-IP 192.168.1.229)
	eHZ interface	V.24 / V.28 with TX, RX, GND and auxiliary supply 9600 bps, 8 N 1 Auxiliary supply level acc. to V.28, minimal 25 mA SML protocol via serial interface
	Extension interface	Used as the wide-area-network (WAN) interface
	Wireless M-Bus	868 MHz wireless interface Physical and link layer acc. to EN 13757-4 Application layer acc. to EN 13757-1, -3 or SML Impedance nominal: 50 ohms; jack: Fakra C, pluggable
Wide-area-network interface	Type	Extension interface 10/100 Base-T (RJ45 plug), Ethernet IEEE802, Auto-Cross-Over IP telemetry, SML protocol via TCP/IP PPoE in DSL mode
Memory depth	Datasets	Size of the data-mirror partition: approx. 12 MB Administration overhead per data collector: approx. 1200 bytes Size of an eHZ dataset: approx. 220 bytes
Time server	Accuracy	+/- 20 ppm at 25°C
	Power reserve	> 48h
	Synchronization	Per Network Time Protocol (NTP)
Environmental conditions	Temperature range	Operation: -10 °C to +55 °C Storage: -40 °C to +70 °C
	Humidity	0-95 %, non-condensing
Enclosure	Design	Top-hat rail enclosure
	Material	Plastic
	Protection rating	IP 20
	Dimensions	Approx. 70 x 60 x 90 mm (L x W x H);
	Weight	Approx. 180g
Power supply	Input voltage	207 V AC … 253 V AC
	Power consumption	Max. 4.5 Watt
Conformity	CE	Yes
	EMV/ESD	Conforms to Guideline 2004/108/EG

		Standards used: EN 55022:2006 Class A, EN 55024: 1998 + A1:2001 + A2:2003, EN 61000-6-2:2001
	Electrical safety	Conforms to Guideline 2006/95/EG Standard used: EN 60950-1:11-2006 Protection rating 2 Overvoltage category II
	Environment	The device meets the requirements of the ROHS and WEEE European Directives.

23.3 ZDUE-PLC-MUC

General information	Use	The ZDUE-PLC-MUC is a meter-data-transmission device to request data from and monitor meters for electricity, gas and water by remote. It uses Power Line Communication to transmit data.
Local interfaces	Customer/service interface I3	10/100 Base-T (RJ45 plug), Ethernet IEEE802, Auto-Cross-Over SML protocol via TCP/IP (Default-IP 192.168.1.229)
	eHZ interface	V.24 / V.28 with TX, RX, GND and auxiliary supply 9600 bps, 8 N 1 Auxiliary supply level acc. to V.28, minimal 25 mA SML protocol via serial interface
	Extension interface	Reserved for future applications
	Wireless M-Bus	868 MHz wireless interface Physical and link layer acc. to EN 13757-4 Application layer acc. to EN 13757-1, -3 or SML Impedance nominal: 50 ohms; jack: Fakra C, pluggable
Wide-area-network interface	Type	Power Line Communication DCSK modulation RENESAS / YTRAN-compatible
	Data rate	Robust Mode (RM) - 2.5 Kbps Extremely Robust Mode (ERM) - 0.625 Kbps Effective data rate (RM) approx. 100 bps / Number of levels
	Band	CENELEC A, compatible to EN 50065
Memory depth	Datasets	Size of the data-mirror partition: approx. 12 MB Administration overhead per data collector: approx. 1200 bytes Size of an eHZ dataset: approx. 220 bytes
Time server	Accuracy	+/- 20 ppm at 25°C
	Power reserve	> 48h
	Synchronization	Uses « Set time » function via PLC
Environmental conditions	Temperature range	Operation: -10 °C to +55 °C Storage: -40 °C to +70 °C
	Humidity	0-95 %, non-condensing
Enclosure	Design	Top-hat rail enclosure
	Material	Plastic
	Protection rating	IP 20
	Dimensions	Approx. 70 x 60 x 90 mm (L x W x H);
	Weight	Approx. 180g

Power supply	Input voltage	207 V AC … 253 V AC
	Power consumption	Max. 3 watts for active PLC communication
Conformity	CE	Yes
	EMV/ESD	Conforms to Guideline 2004/108/EG Standards used: EN 55022:2006 Class A, EN 55024: 1998 + A1:2001 + A2:2003, EN 61000-6-2:2001
	Electrical safety	Conforms to Guideline 2006/95/EG Standard used: EN 60950-1:11-2006 Protection rating 2 Overvoltage category II
	Environment	The device meets the requirements of the ROHS and WEEE European Directives.

23.4 ZDUE-DC-MUC

General information	Use	The ZDUE-DC-MUC is a meter-data-transmission device to request data from and monitor meters for electricity, gas and water by remote. It uses the GPRS service of the GSM mobile communications network to transmit data to the control center and Power Line Communication for neighborhood communication.
Local interfaces	Customer/service interface I3	10/100 Base-T (RJ45 plug), Ethernet IEEE802, Auto-Cross-Over SML protocol via TCP/IP (Default-IP 192.168.1.229)
	eHZ interface	V.24 / V.28 with TX, RX, GND and auxiliary supply 9600 bps, 8 N 1 Auxiliary supply level acc. to V.28, minimal 25 mA SML protocol via serial interface
	Extension interface	Reserved for future applications
	Wireless M-Bus	Not included
Wide-area-network interface	Type	Quad-band GSM/GPRS wireless module EGSM 850, 900, 1800, 1900
	Output power	Class 4 (2W) for 850 / 900 MHz Class 1 (1W) for 1800 / 1900 MHz
	GPRS	Multislot Class 10 (3+2 & 4+1) DL up to 85.6 kbps, UL up to 42.8 kbps Coding Scheme: CS1 to CS 4 Mobile Station Class B SML protocol via TCP/IP
	GSM	Circuit Switched Data (CSD) 9600 bps, non-transparent SML protocol via serial CSD connection
	GSM antenna connection	Impedance nominal: 50 ohms; jack: Fakra D, pluggable
Neighborhood communication	Type	Power Line Communication DCSK modulation RENESAS / YTRAN compatible
	Bit rate	Robust Mode (RM) - 2.5 Kbps Extremely Robust Mode (ERM) - 0.625 Kbps Effective data rate (RM) approx. 100 bps / number of levels
	Band	CENELEC A, compatible to EN 50065
Time server	Accuracy	+/- 20 ppm at 25°C
	Power reserve	> 48h
	Synchronization	Per Network Time Protocol (NTP)
Capacity	MUCs connected	Up to 100 ZDUE-MUCs (from daily values)

Environmental conditions	Temperature range	Operation: -10 °C to +55 °C Storage: -40 °C to +70 °C
	Humidity	0-95 %, non-condensing
Enclosure	Design	Top-hat rail enclosure
	Material	Plastic
	Protection rating	IP 20
	Dimensions	Approx. 160 x 60 x 90 mm (W x D x H);
	Weight	Approx. 280g
Power supply	Input voltage	207 V AC … 253 V AC
	Power consumption	Max. 7 watts for GSM/GPRS mode, highest transmission power, active data transfer Approx. 3 watts for GSM/GPRS mode, GPRS logged in, no data transfer
Conformity	CE	Yes
	EMV/ESD	Conforms to Guideline 2004/108/EG Standards used: EN 55022:2006 Class A, EN 55024: 1998 + A1:2001 + A2:2003, EN 61000-6-2:2001
	Electrical safety	Conforms to Guideline 2006/95/EG Standard used: EN 60950-1:11-2006 Protection rating 2 Overvoltage category II
	R&TTE	EN301419-1, EN301511
	Environment	The device meets the requirements of the ROHS and WEEE European Directives.